

GLOBAL QUALITY



Damping & vibration control systems
for transmission lines



DAMP
KNILL GRUPPE

Damp - Specialist in Vibration Control

Damp is a leading manufacturer of spacers, spacer dampers and vibration dampers for high voltage overhead transmission lines, employed to protect the conductors from severe fatigue failures due to wind induced motions.

Damp was established in 1974 by a group of companies that had been working in the Power Line Industry since 1907 and at the beginning of 2008 it was taken over by Mosdorfer GmbH - Austria, one of the leading companies dealing in Hardware Fittings for Power Transmission Lines and integrated in the Knill Gruppe, a private owned family business active in many countries in the field of infrastructures, supplying systems and applications for energy and data transmission.

Products

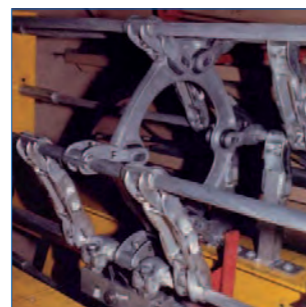
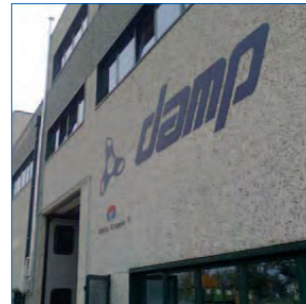
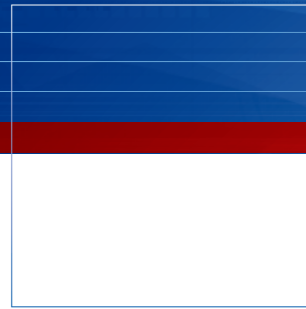
Several millions of units for two, three, four, six and eight bundle conductors are successfully in operation throughout the world. The components are made with very high quality materials and the damping elements are specifically designed for this application.

The damping capacities have proven to be effective throughout the years, the clamping and locking systems are designed to prevent any loosening due to vibrations induced by conductor motions.

Supported by a skilled team of engineers and advanced instrumentation Damp has acquired in the course of the years a position of great prestige and has earned an excellent reputation for the quality of its products, both as manufacturer and consultant.

Damp, along with Mosdorfer, collaborates in National and International Working Groups and is specialized in the design of damping systems for special applications such as fjords and large river crossings. For special purposes Damp and Mosdorfer operate in collaboration with The University of Graz, the Polytechnic University of Milan and other well known specialists.

All damping system designs are fully supported by the latest computer vibration analysis to simulate the conductor/bundle behaviour under wind induced vibrations. Extensive laboratory and field tests are continuously being performed with results covering;



Riv and Corona tests from 1974
Short circuit tests from 1978
Field tests from 1979

Spacer dampers are primarily made of aluminum alloy to achieve the highest mechanical performances.

Clamps are of "easy assembly" type with one bolt and designed to apply the required pressure on the conductor without damaging it. The contact length between clamp surface and conductor is 70 mm, in order to guarantee a proper grip. The tightening device is arranged using two elements (bolt and nut), both of steel, which bind one to the other by means of screw thread. Monometallic fasteners are more stable than bimetallic fasteners like, for example, steel bolt and threaded hole into the aluminum clamp body. Different thermal elongation of the different materials can modify the tightening conditions¹.

In order to avoid the unscrewing of the above device, resulting from vibrations, an appropriate locking system is used.

The clamp bores are in contact with the conductor over the entire clamping surface except for rounded edges. The clamp bores are sized to fit exactly the designed conductor and not a "conductor diameter range"¹. The bore of the clamp body and clamp cap are smooth and free of projections, grit or other material which can cause damage to the conductor when the clamp is installed. The bore surface is made by casting and is not subjected to any other manufacturing process (such as sand-blasting for example in order to increase artificially the coefficient of friction between the clamps and the conductor). All clamping bolt heads are oriented downwards for ground level viewing.

The clamp is capable of withstanding a torque over 200 % of the nominal design installation torque (40 Nm) without failure of component parts when installed on the conductor.

Damp spacer dampers are designed and manufactured in accordance with the latest IEC Standards 61854 and meet the technical requirements of major Electricity Power Boards and utilities.

Specially designed spacer dampers can be supplied for any specific demand (e.g. expanded and asymmetric bundles, high conductor temperatures up to 210° C, etc.).

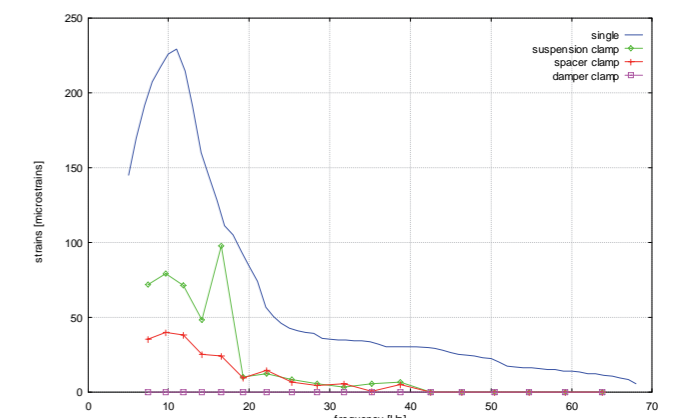
¹ CIGRE' Report 22-01 (WG11) 233 "Reliable Clamping Systems and Correct Installation"



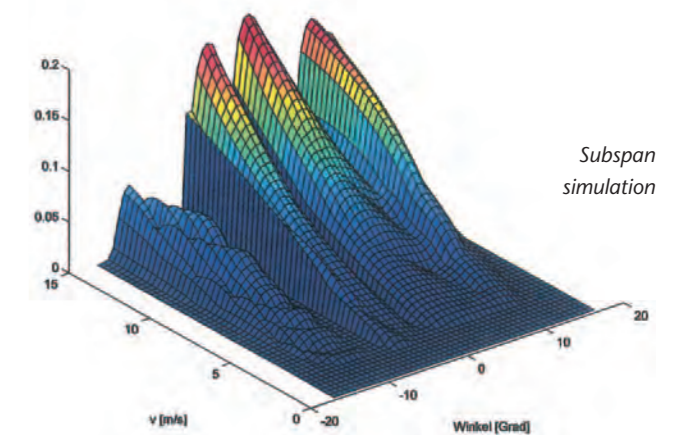
Vibration measurement on erected line

Vibration Analysis

State of the art computer programs for the vibration study of the transmission lines are available at Damp; such programs allow to simulate the load on the conductor, due to the various kind of conductors motions depending on the environment parameters such as temperature, wind speed, E.D.S., etc. Special computer programs are also used to work out the final staggering scheme of the spacer dampers on the line.



Aelian vibration simulation



Subspan simulation



Other available applications:

Rubber lined clamps. Armoured rods clamps. Spacer dampers for expanded bundles.

High temperature conductors: Spacer dampers for high temperature conductors (150° C) are in service since 2009. For GZTACSR operating, up to 210° C, 50,000 quadruple spacer dampers are in service as of 2010.

Clamps with break-away cap, a system that allows proper bolt torque without the use of a specific torque wrench, can also be provided. To improve the performances of damping systems vibration dampers - Stockbridge type 4-resonance vibration dampers are also available. In particular applications, e.g. twin bundle with AAAC, the combination of spacer dampers and vibration dampers is the right solution.



Content



More than 4,500,000 Damp spacer dampers are in operation all over the world under the most different climatic, environmental and mechanical conditions, from any voltage up to 800 kV; most of the strategic grids in the world rely on Damp products.

Technical assistance can be provided by Damp to carry out vibration measurements on erected lines and to evaluate the damping conditions.

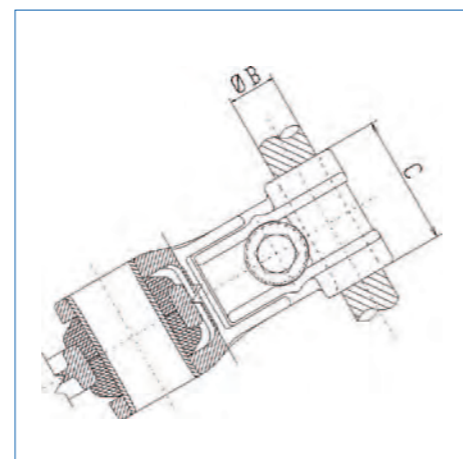
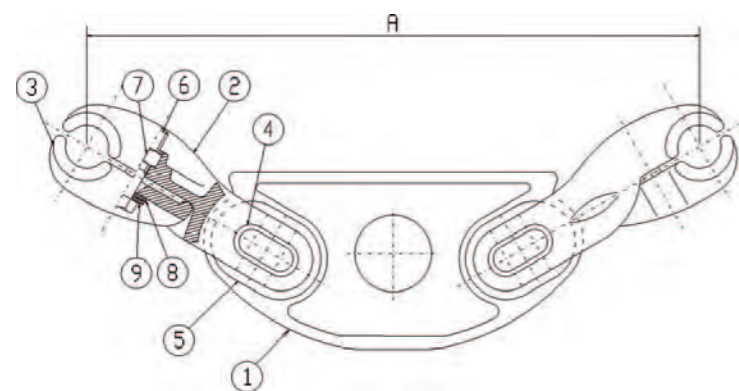
Page	Spacer damper	
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Special applications not shown in this publication that are needed to meet particular requirements, are already available or can be developed on request.

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Spacer damper for twin bundle



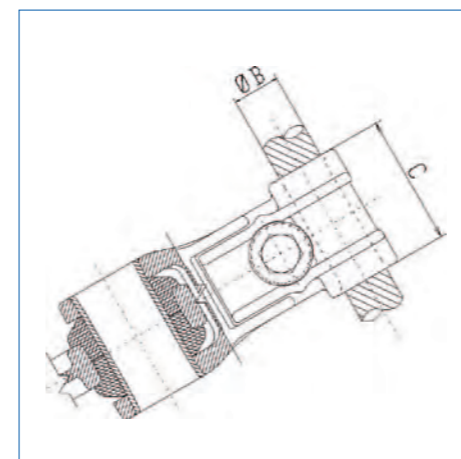
Item	Description
1	Central body
2	Clamp body
3	Clamp cap
4	Tube
5	Bush
6	Bolt M12
7	Nut M12
8	Plain washer
9	Belleville washer

Standard Dimensions		
Spacing - A mm (inch)	Conductor Diameter - Ø B mm (inch)	Clamp width - C mm (inch)
300-330-400-450-457-500-550 mm (11,8-13-15,7-17,7-18-19,7-21,7")	20 to 42 mm (0,8 to 1,7")	78 mm (3,07")

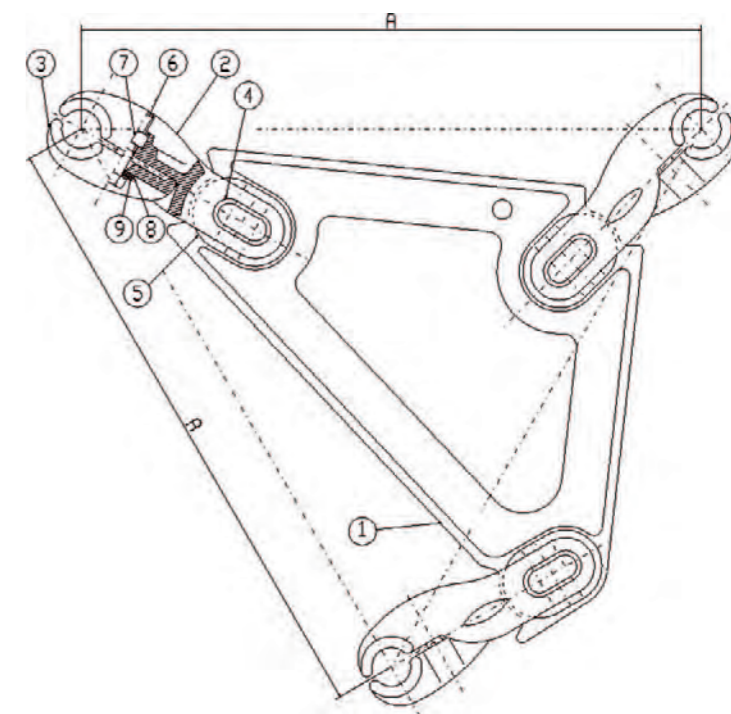
On Request: Bolts can be provided with zinc alloy break away cap / Components in stainless steel available / other dimensions.

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Spacer damper for triple bundle



Item	Description
1	Central body
2	Clamp body
3	Clamp cap
4	Tube
5	Bush
6	Bolt M12
7	Nut M12
8	Plain washer
9	Belleville washer

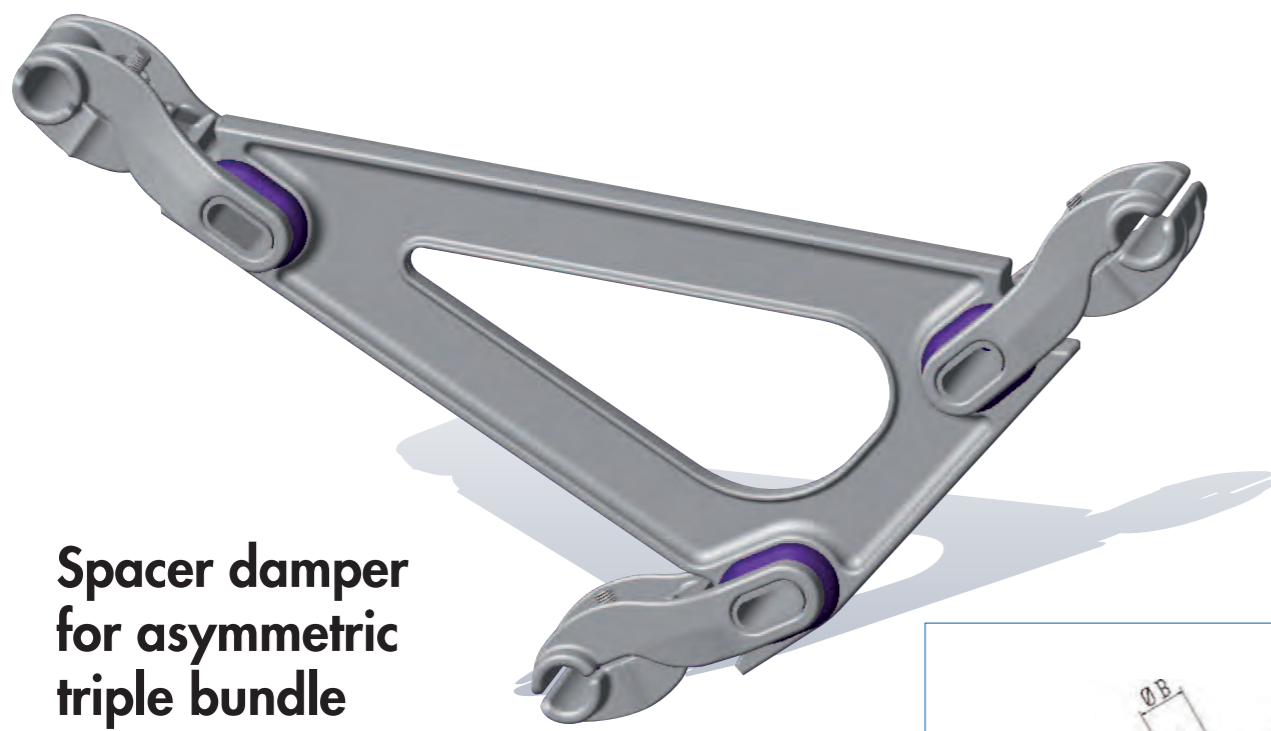


Standard Dimensions		
Spacing - A mm (inch)	Conductor Diameter - Ø B mm (inch)	Clamp width - C mm (inch)
400-450-457-500 mm (15,7-17,7-18-19,7")	20 to 42 mm (0,8 to 1,7")	78 mm (3,07")

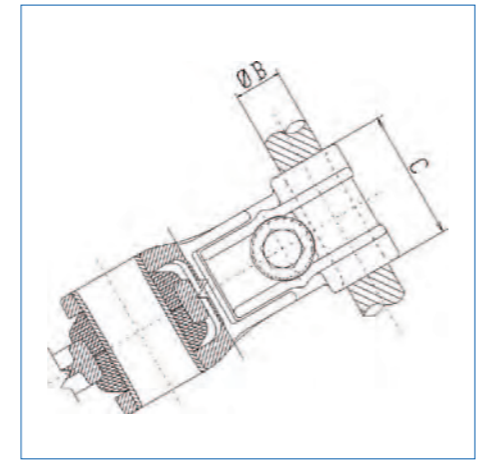
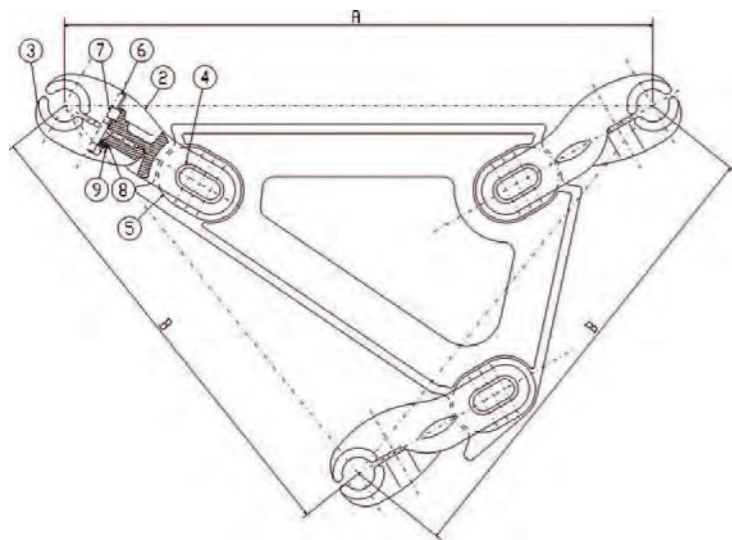
On Request: Bolts can be provided with zinc alloy break away cap / Components in stainless steel available / other dimensions.



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Spacer damper for asymmetric triple bundle



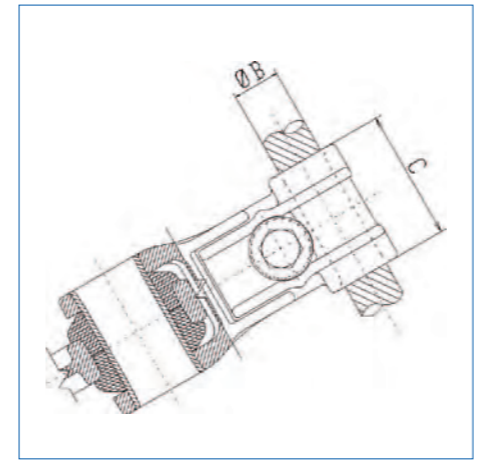
Item	Description
1	Central body
2	Clamp body
3	Clamp cap
4	Tube
5	Bush
6	Bolt M12
7	Nut M12
8	Plain washer
9	Belleville washer

Standard Dimensions		
Spacing - A and B inch	Conductor Diameter - Ø B inch	Clamp width - C inch
A x B = 20" x 16"	0,79" to 1,65"	3,07"
A x B = 25.5" x 18"		

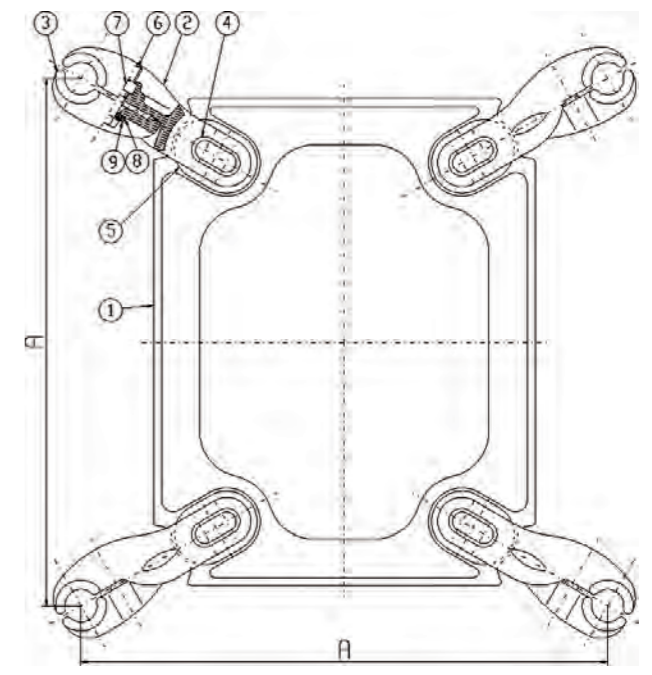
On Request: Bolts can be provided with zinc alloy break away cap / Components in stainless steel available / other dimensions.

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Spacer damper for quad bundle



Item	Description
1	Central body
2	Clamp body
3	Clamp cap
4	Tube
5	Bush
6	Bolt M12
7	Nut M12
8	Plain washer
9	Belleville washer



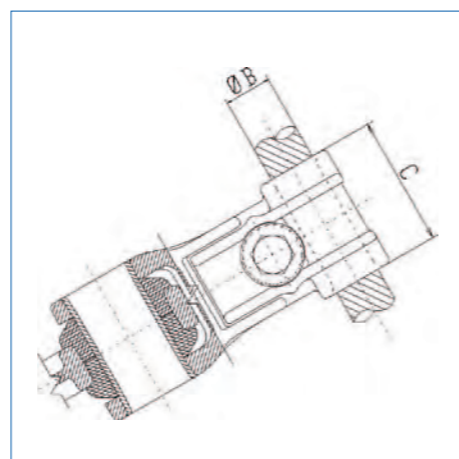
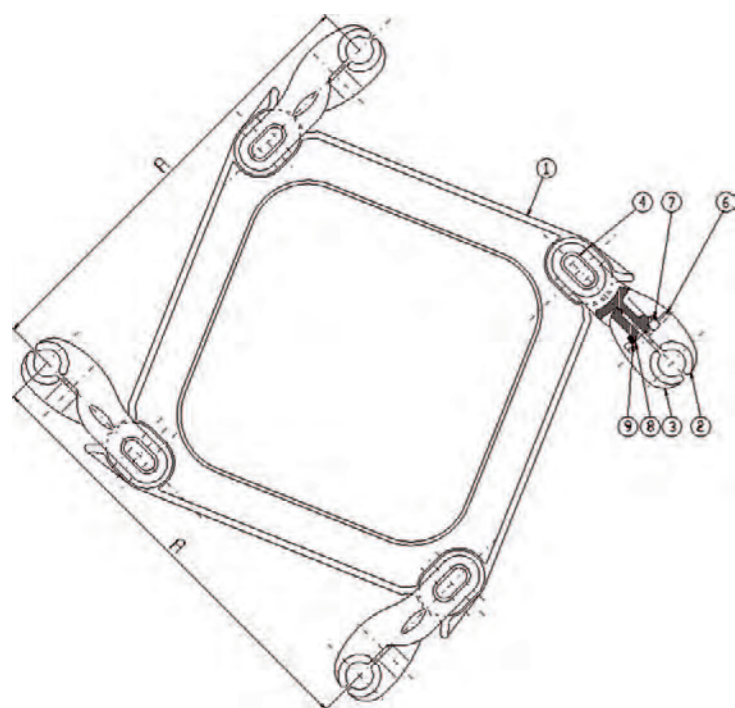
Standard Dimensions		
Spacing - A mm (inch)	Conductor Diameter - Ø B mm (inch)	Clamp width - C mm (inch)
400-450-457-600 mm (15,7-17,7-18-23,6")	20 to 42 mm (0,8 to 1,7")	78 mm (3,07")

On Request: Bolts can be provided with zinc alloy break away cap / Components in stainless steel available / other dimensions.





Spacer damper for diamond bundle



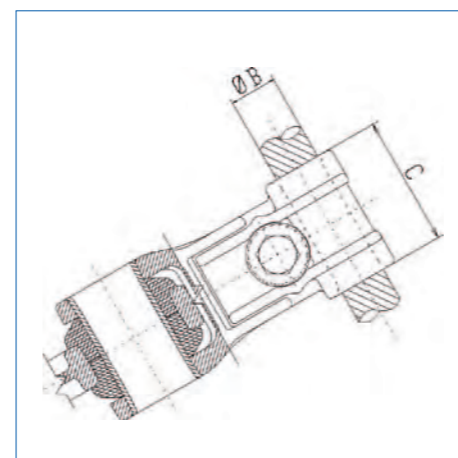
Item	Description
1	Frame support
2	Clamp body
3	Clamp cap
4	Tube
5	Bush
6	Bolt M12
7	Nut M12
8	Plain washer
9	Belleville washer
10	Frame

Standard Dimensions		
Spacing - A mm (inch)	Conductor Diameter - Ø B mm (inch)	Clamp width - C mm (inch)
457 mm (18")	20 to 42 mm (0,8 to 1,7")	78 mm (3,07")

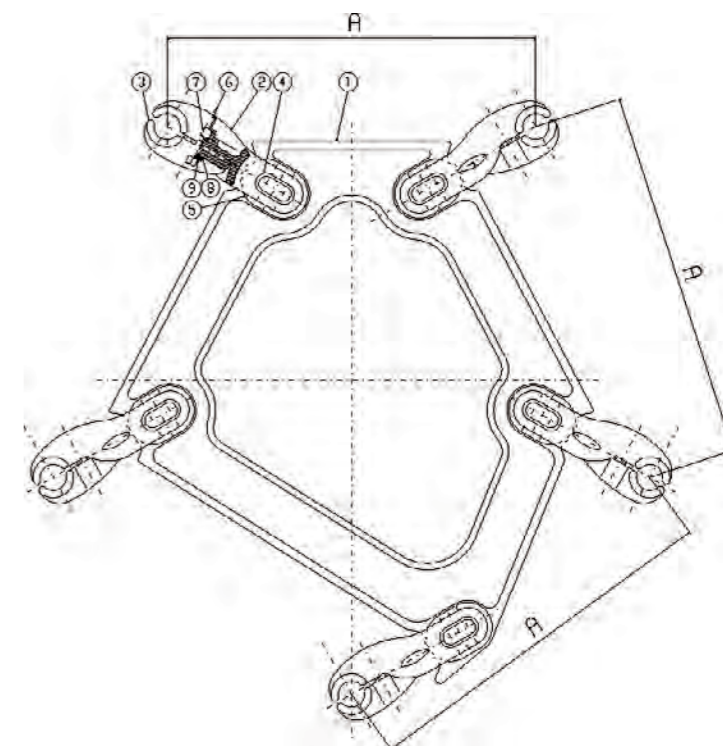
On Request: Bolts can be provided with zinc alloy break away cap / Components in stainless steel available / other dimensions.



Spacer damper for pentagonal bundle



Item	Description
1	Central body
2	Clamp body
3	Clamp cap
4	Tube
5	Bush
6	Bolt M12
7	Nut M12
8	Plain washer
9	Belleville washer

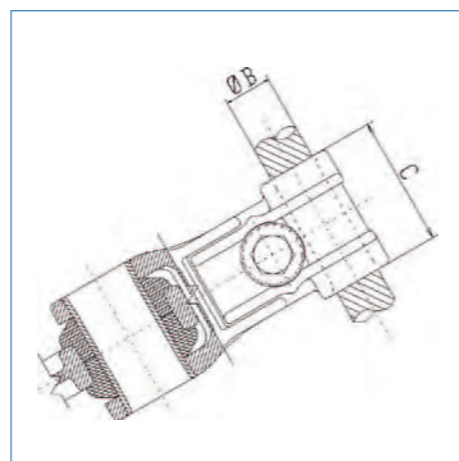
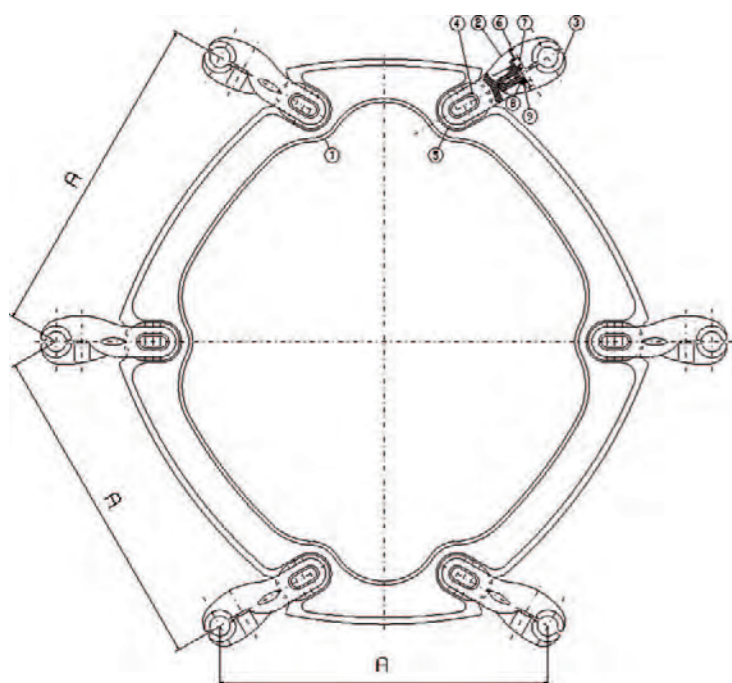


Standard Dimensions		
Spacing - A mm (inch)	Conductor Diameter - Ø B mm (inch)	Clamp width - C mm (inch)
400 mm (15,7")	20 to 42 mm (0,8 to 1,7")	78 mm (3,07")

On Request: Bolts can be provided with zinc alloy break away cap / Components in stainless steel available / other dimensions.



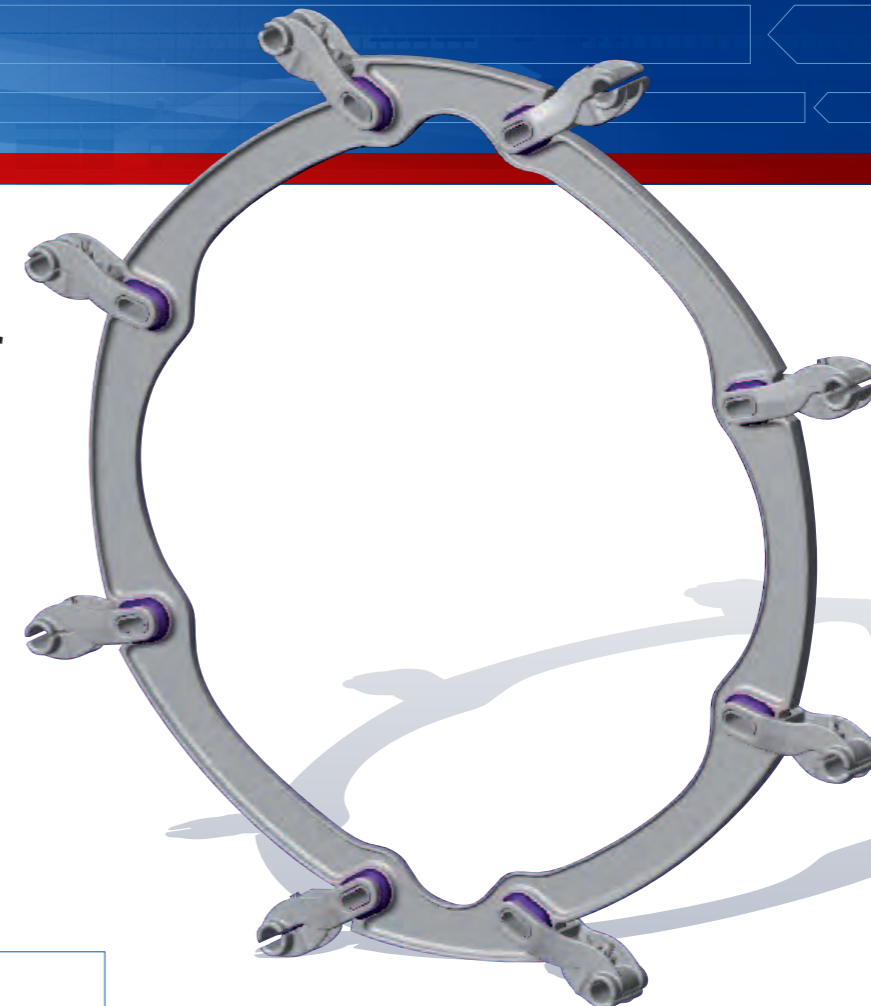
Spacer damper for hexagonal bundle



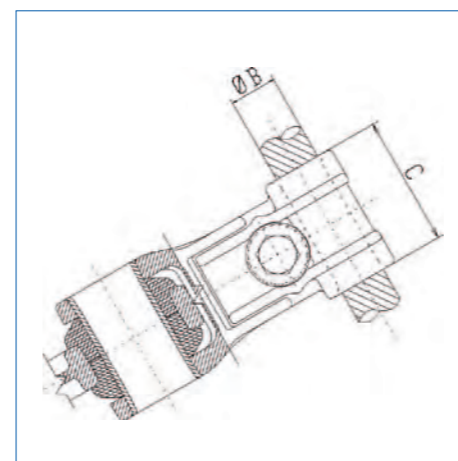
Item	Description
1	Central body
2	Clamp body
3	Clamp cap
4	Tube
5	Bush
6	Bolt M12
7	Nut M12
8	Plain washer
9	Belleville washer

Standard Dimensions		
Spacing - A mm (inch)	Conductor Diameter - Ø B mm (inch)	Clamp width - C mm (inch)
457 mm (18")	20 to 42 mm (0,8 to 1,7")	78 mm (3,07")

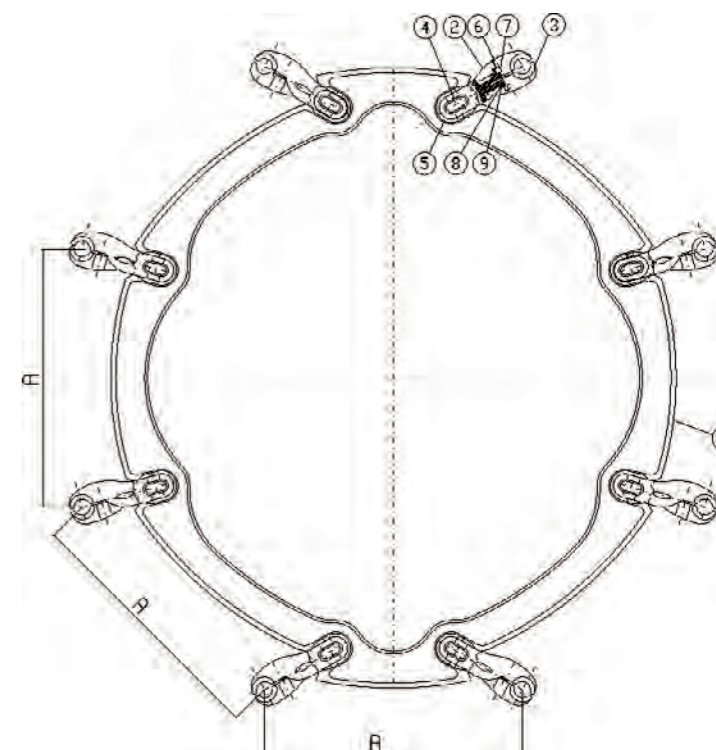
On Request: Bolts can be provided with zinc alloy break away cap / Components in stainless steel available / other dimensions.



Spacer damper for octagonal bundle



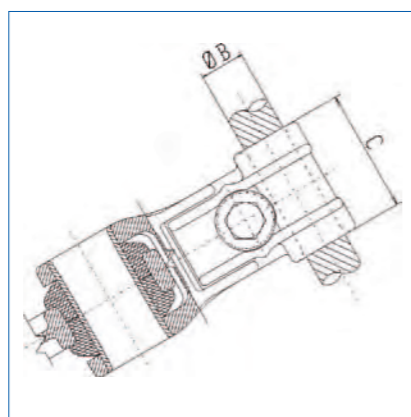
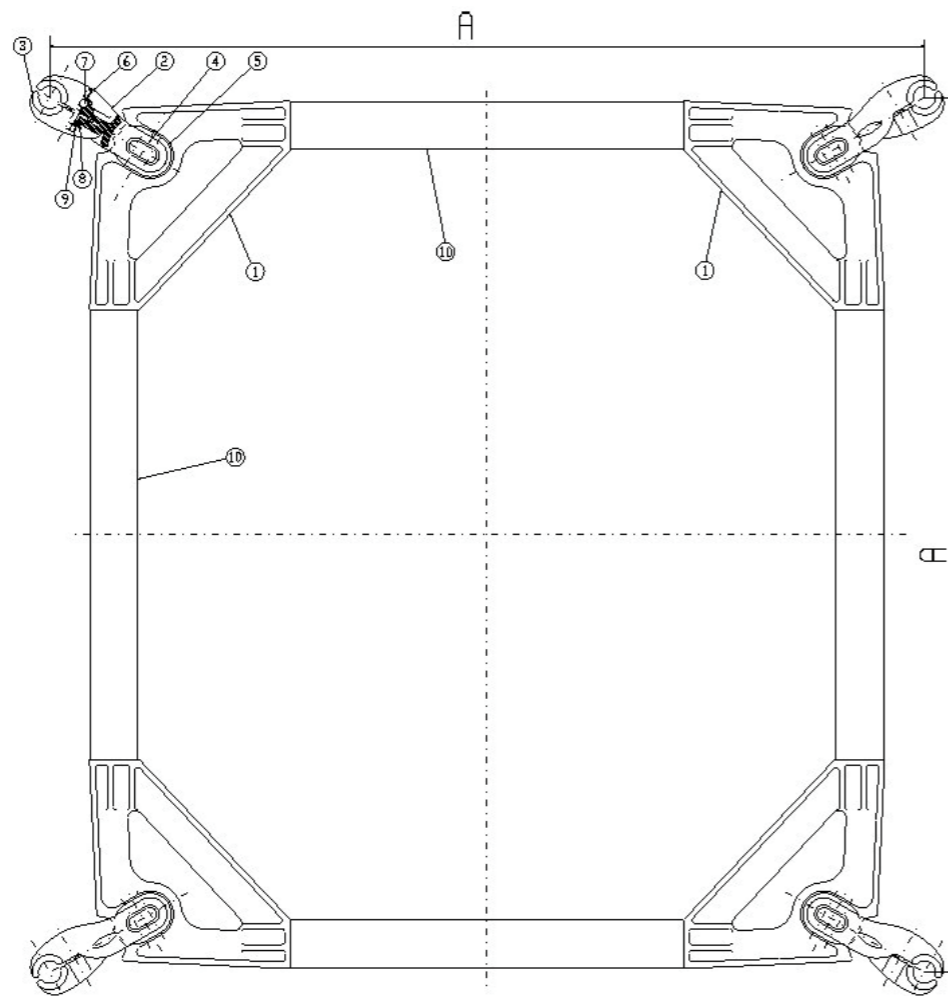
Item	Description
1	Central body
2	Clamp body
3	Clamp cap
4	Tube
5	Bush
6	Bolt M12
7	Nut M12
8	Plain washer
9	Belleville washer



Standard Dimensions		
Spacing - A mm (inch)	Conductor Diameter - Ø B mm (inch)	Clamp width - C mm (inch)
457 mm (18")	20 to 42 mm (0,8 to 1,7")	78 mm (3,07")

On Request: Bolts can be provided with zinc alloy break away cap / Components in stainless steel available / other dimensions.

Spacer damper for expanded bundle



Item	Description
1	Central body
2	Clamp body
3	Clamp cap
4	Tube
5	Bush
6	Bolt M12
7	Nut M12
8	Plain washer
9	Belleville washer

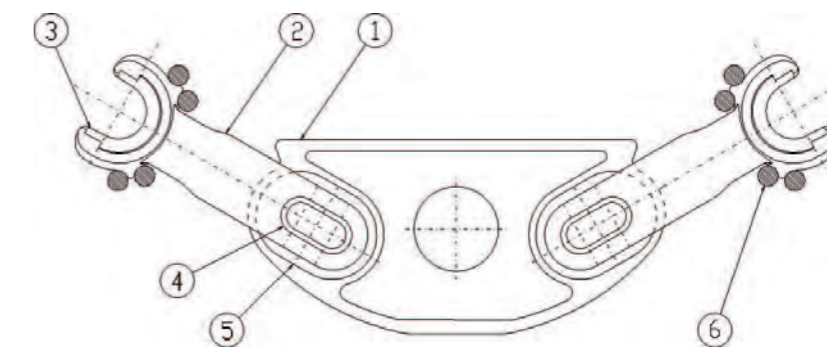
Standard Dimensions		
Spacing - A mm (inch)	Conductor Diameter - Ø B mm (inch)	Clamp width - C mm (inch)
1200 mm (47,2")	20 to 42 mm (0,8 to 1,7")	78 mm (3,07")

On Request: Bolts can be provided with zinc alloy break away cap / Components in stainless steel available / other dimensions.

Other applications

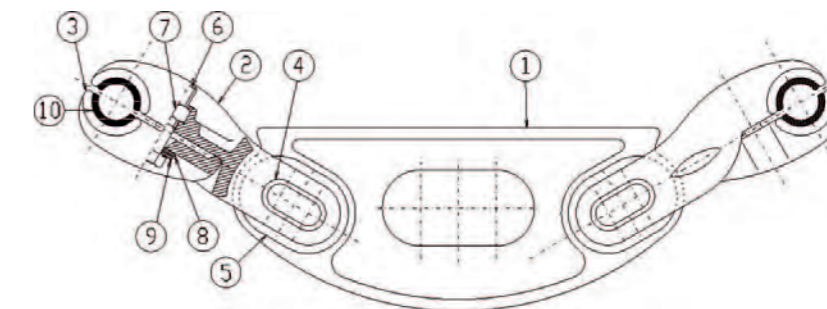
Armoured rod clamps

Item	Description
1	Central body
2	Clamp body
3	Bush
4	Tube
5	Bush
6	Retaining rod



Rubber lined clamps

Item	Description
1	Central body
2	Clamp body
3	Clamp cap
4	Tube
5	Bush
6	Bolt M12
7	Nut M12
8	Plain washer
9	Belleville washer
10	Bush



On Request:
Bolts can be provided with zinc alloy break away cap / Components in stainless steel available / other dimensions.

*All products fulfill the requirements of IEC Standard 64854
and other important corresponding European and international standards.*

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