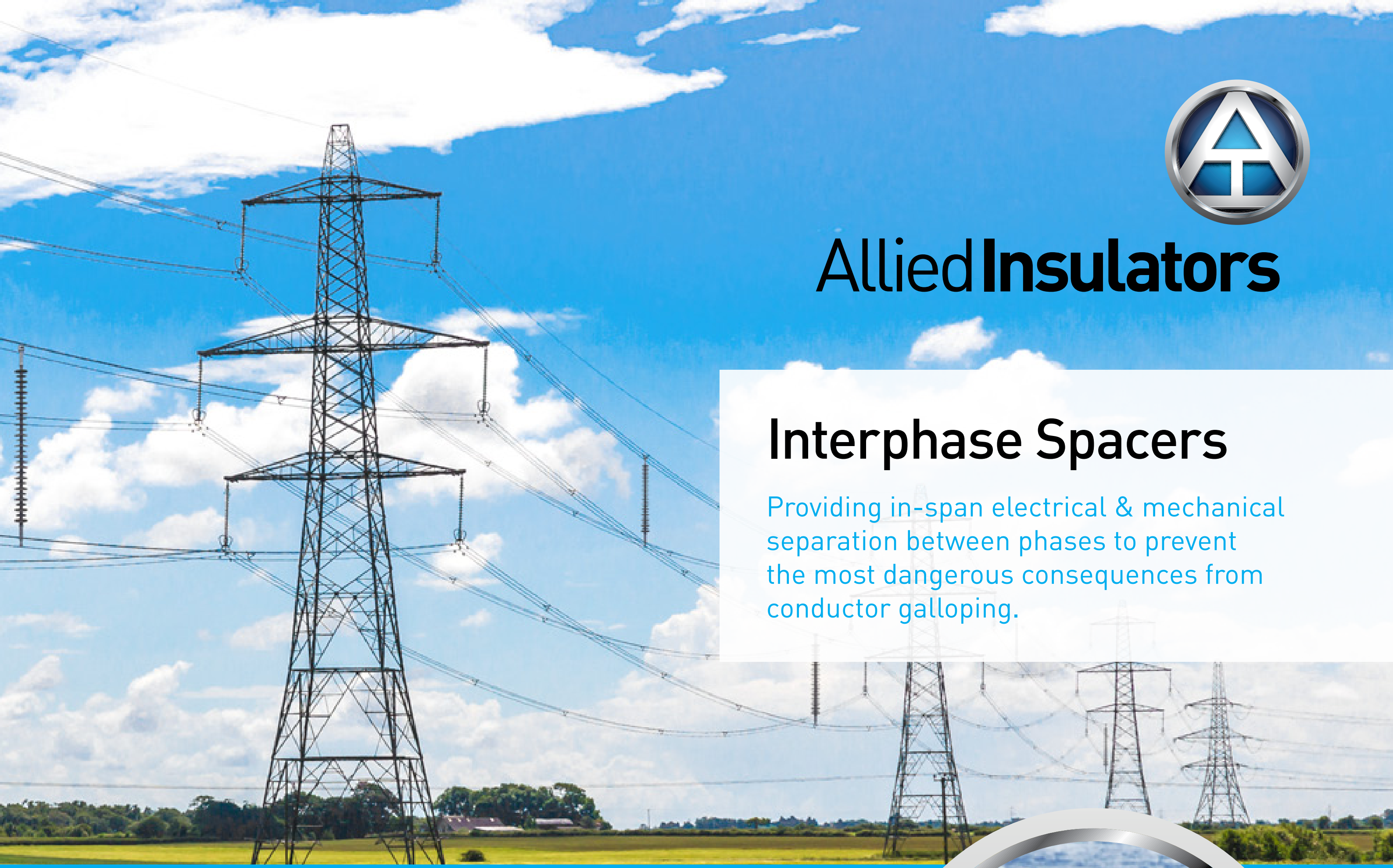

AlliedInsulators

Interphase Spacers

Providing in-span electrical & mechanical separation between phases to prevent the most dangerous consequences from conductor galloping.

The majority of the UK's power network is exposed to the many forces of nature. Both wind and ice can cause severe problems when it comes to providing a reliable transmission and distribution network.

In certain cases these climatic conditions can lead to the development of cyclic conductor motions or vibrations on the transmission and distribution overhead lines known as Aeolian Vibration & Conductor Galloping.

Conductor Galloping

Galloping is often caused by the asymmetric conductor aerodynamics due to ice build-up on one side of a conductor during icing events. The crescent of encrusted ice simulates an aerofoil, altering the normally round profile of the wire. This increases the tendency to oscillate at greater amplitudes due to the conventional lift and stall motion of the aerofoil. Additionally wind induced galloping alone can be caused by violent wind gusting on non-iced conductors. These oscillations can have huge amplitudes (→10m) and produce extreme dynamic stresses in the conductors. This results in damage to the tower structures, insulators and fittings.

The most devastating aspect of galloping is the potential phase to phase short circuits. The cycle of oscillations continues with the conductors gaining momentum, until they become so close that flashover and power arcs occur between phases. Consequently conductor damage or burn down and system interruptions are inevitable.

Aeolian Vibrations

Aeolian vibrations are caused by low speed laminar winds impart a lifting motion to the conductors. Stresses occur near conductor fixation points such as clamps and can cause breakage of individual strands. These vibrations are a concern due to their long term fatiguing of the network.

Preventing these phenomena is of fundamental importance in maintaining reliable service of the line. InterPhase Spacers have been developed by Allied Insulators to minimise the probability of these occurrences by maintaining conductor separation and producing damping on susceptible lines.

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Product Details & Functionality

Interphase Spacers consist of a specially designed phase to phase composite insulator that is capable of withstanding the extreme dynamic loadings and midspan stresses between conductors. Additionally a key feature of the design is the articulation and conductor attachment points, thus ensuring no strand damage occurs when in position.

Key Features

- Improved network reliability and reduced susceptibility to weather and climatic events.
- Reduced system interruptions and unplanned outages.
- Reduced maintenance to the Insulators and conductor fittings in exposed locations. Lightweight, easy to handle and install.
- Service life – Proven performance globally.
- Low life cycle cost and rapid investment return.
- Design to suit any conductors, configuration and voltage.
- Also as a damping unit, with the composite core absorbing vibrational energy to combat Aeolian vibrations.

Design & Testing

Extensive development and testing has been carried out at our approved testing facility. The interphase spacers are subjected to a rigorous torsional & compressional fatigue test, deflection test and a 30 million cycle vibration test to ensure the Insulators suitable for the application.

Due to their position as Phase-Phase Insulators there are key electrical design parameters to consider, including:

- Power frequency voltage distribution along the unit and flashover under contamination;
- Switching impulse flashover voltage across conductor-to-conductor gaps;
- Lightning impulse flashover voltage.

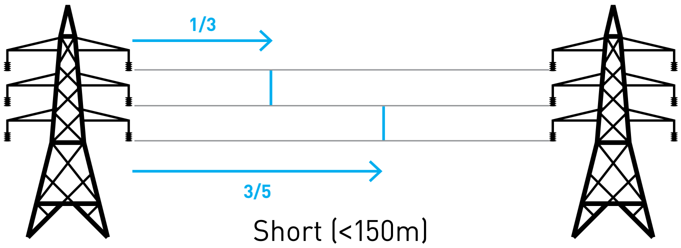
The power frequency electric stresses across an interphase spacer are about 73% higher than for phase-to earth insulation because spacers are subjected to phase-phase voltage.

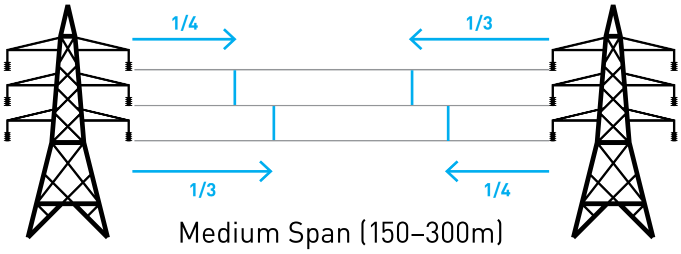
Installation

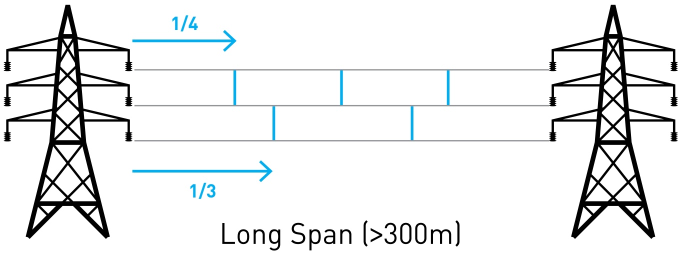
Symmetrical installation must be avoided when installing interphase spacers. Staggering their position ensures standing waves are restricted and optimum anti-galloping performance is maintained. Allied Insulators can provide full support during design and planning stage to ensure maximum reliability and product performance.

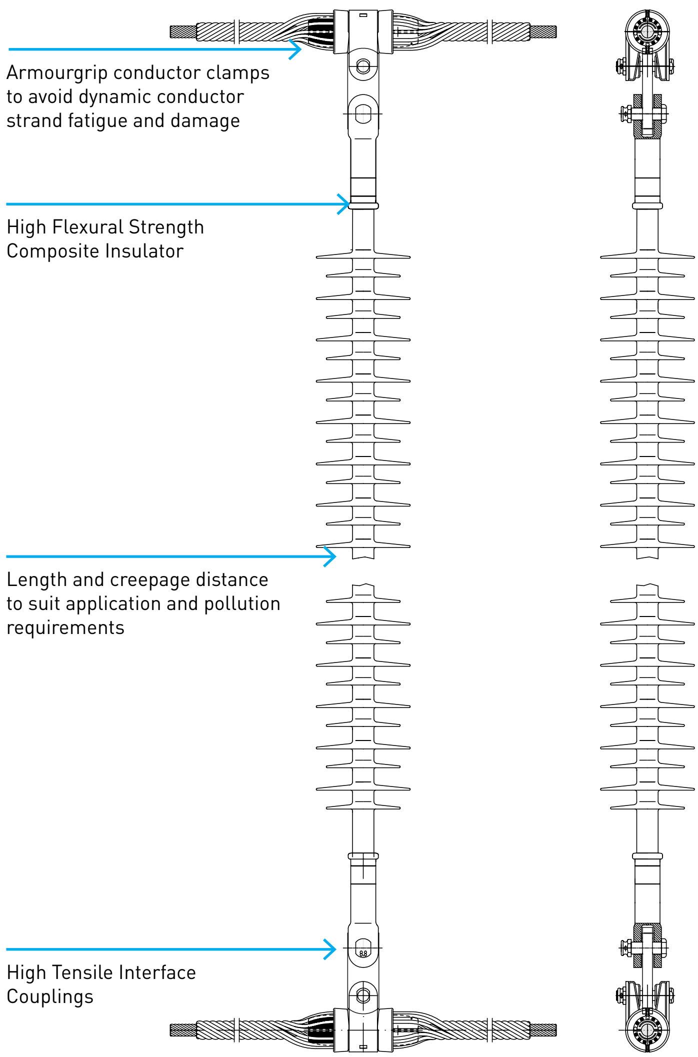
Typical examples of a 400kV span utilising interphase spacers.

Span	Quantity	Distance Along Span (S = Span Length	
		Upper phase to middle phase	Middle phase to lower phase
Short (<150m)	2	S 1/3	S 3/5
Medium (150–300m)	4	S 1/4, S 2/3	S 1/3, S 3/4
Long (>300m)	5	S 1/4, S 1/2, S 3/4	S 1/3, S 2/3









Interphase Spacers are available to service 33kV to 400kV systems.

Manufactured to the following standards:
IEC 61109 Composite Insulators for Overhead Lines
IEC 61284 Overhead Line fittings

NOTE: GRADING RINGS ARE UTILISED FOR 132KV SYSTEMS AND ABOVE