

STAUFF WPC

Wind power clamps for fastening cables



The modular system provides for a number of different installation options for almost any arrangement in the tower.

STAUFF fastening solution for the wind power industry

Quick and Secure Fastening

The WPC system developed by STAUFF is a product range specifically designed for fixing electrical cables in wind turbine towers. Key features of the WPC clamps include simple, fast and tool-free assembly, permanent fastening of cables under adverse conditions and compliance with all industry-relevant requirements, among others governing electrical safety.

How much time does a well-trained team need to install electrical cables with cross-sections of 22 to 38 mm in a wind turbine tower some 100 or 150 metres tall? The answer to this question has implications for the competitiveness of the wind turbine manufacturer. And another question: How can you fix these cables in such a way that they are retained securely in position over many years under adverse conditions, at the same time providing the flexibility needed for the movement of the tower in strong winds? Once again, this is a crucial parameter for the lifetime of the cables and the availability of the wind turbine.

From the perspective of wind turbine manufacturers and operators, STAUFF provided the first satisfactory answer to these questions some years ago with a first generation of fastening system, developed from scratch specifically for use with electrical cables in wind turbines.

This fastening solution was based on the proven STAUFF clamp use for fastening pipes, tubes and hose in hydraulic systems. For Wind Tower Application, cables – either single cables or in rows – are laid into the recesses of a base plate, which is screwed or welded to the substructure, and fixed in place with screw covers. This solution has been used successfully, but the engineers at STAUFF continued to look for a solution that specifically simplifies assembly, without impairing the permanently fixed seating of the cables. To satisfy these requirements a new range, designated WPC, was developed in collaboration with a leading wind turbine manufacturer.

Fast and tool-free assembly reduces installation costs

The basic concept of the WPC clamp: The cable holder is screwed onto a rail or similar – with various assembly options available – and the cable is inserted. A quick-clamping system, i.e. a handle, is used to close the counterside, which is hinged to the cable holder – and that's all there is to it. Using the WPC clamp technician can install cables without the need for tools. This is a key factor that simplifies installation in both the horizontal tower segment and in the erected tower, saving the manufacturer installation costs.

There are two basic versions of the new system available – the WPC for a single cable, and the WPC-Trefoil for three cables, fastened in a compact clover leaf pattern. The system can accommodate Cables with cross-sections of 22 to 38 mm.

Permanent tight cable seating

The fact that cables are permanently and tightly fixed in place is a key feature of the fastening system. The flexible elastomer cable holder provides consistent retention forces – even in the event of unexpected deviations in the tolerance of the outer cable diameter. An adjusting screw with locking nut is used the clamping pressure on the cable diameter.

Once installed however, a certain tolerance needs to be allowed for, as the tower moves in the wind and the cable fastening system must this movement.

A spring package in the quick-clamping system guarantees continuous pre-tension of the closure. A securing lock prevents unintentional opening of the clamping and closure mechanism. Tool-free assembly aids initial installation of the cables in the tower and maintenance or replacement of cables when the wind turbine is in operation.

Adapted for adverse conditions

Severe ambient conditions for electrical components are common in wind turbine towers: extreme temperatures and a corrosive atmosphere are to be expected. The metal components of the WPC range are available in various high-grade materials (steel zinc/nickel-coated for onshore wind turbines, V4A stainless steel for offshore wind turbines).

The steel version with a highly effective corrosion protection coating based on a zinc nickel finish, has proven to be a cost-effective alternative to stainless steel in many different applications. It achieves a service life of some 1,200 hours in the salt spray test, which is higher than the applicable standards required in the automotive industry, among others.

The elastomer used in the wind power clamps is temperature-stable between -45°C and $+90^{\circ}\text{C}$ (in continuous use; temporary use up to $+125^{\circ}\text{C}$). It also absorbs no water in the presence of moisture and so remains dimensionally stable.

Fully tested: Fire protection, short circuit resistance, mechanical stress

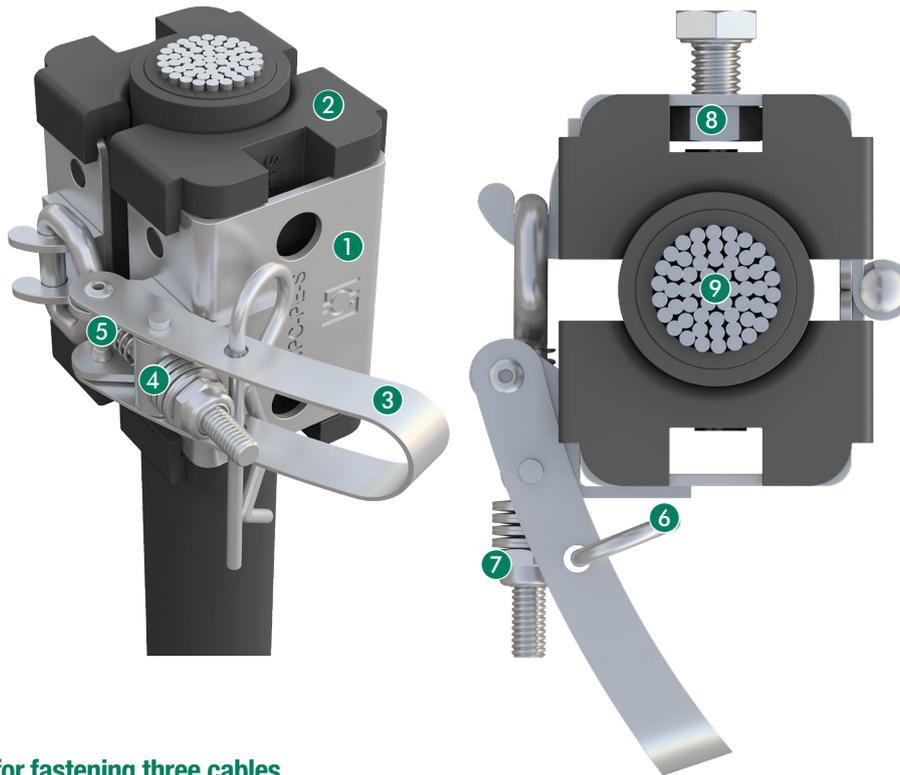
STAUFF WPC clamps meet all relevant fire protection requirements and have also been tested and approved as fire protection material SA-V0 according to UL 94. STAUFF has also tested the electrical properties – particularly the short circuit resistance of the WPC range – in conjunction with a wind turbine and a cable manufacturer. This demonstrated the unrestricted suitability of the fastening system for the transmission of high currents.

Mechanical stress tests confirm a high axial retention force with very good protection of the cable jacket. Further tests showed that low temperatures do not have a negative impact on the retention forces in the fastening system. On the contrary, the retention force was even higher than in the test conducted at room temperature. This is whether the elastomer / metal material combination positively comes into its own.

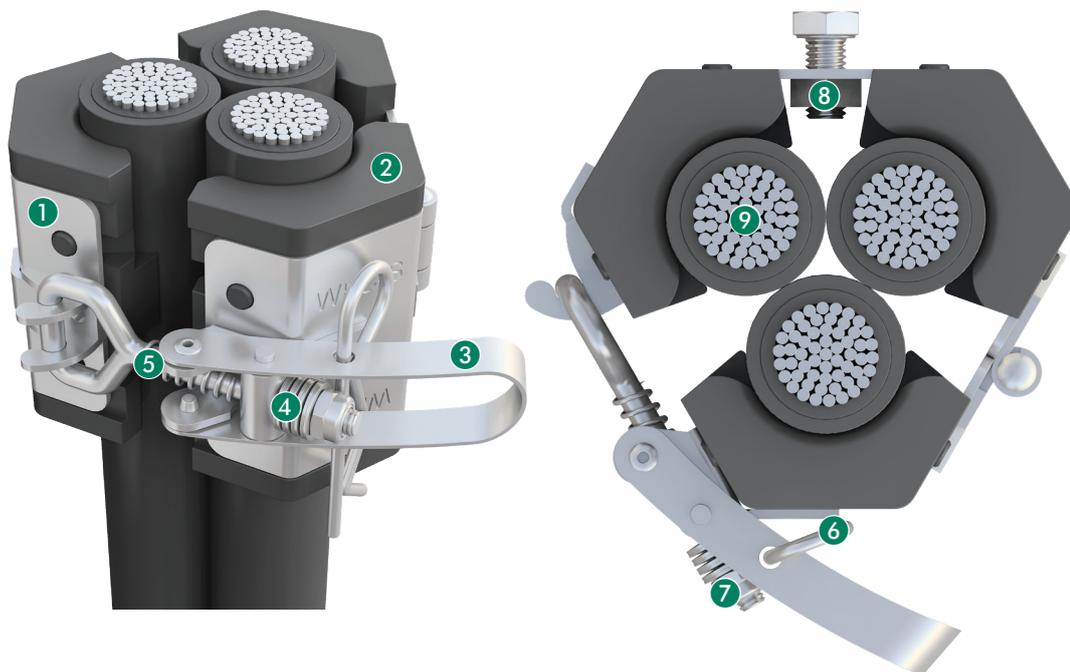
Broad-based range – customised products also available

These properties make the WPC system ideal for the fastening of electrical cables on onshore and offshore wind turbines. Various basic versions for a single cable and for three cables are available ex-stock. And the modular design of the system enables it to be adapted to individual applications. For instance, one or two clamp bodies with replaceable elastomer could be used as cable protection for different cable diameters.

Wind power clamp for fastening one cable Type WPC-PE-S



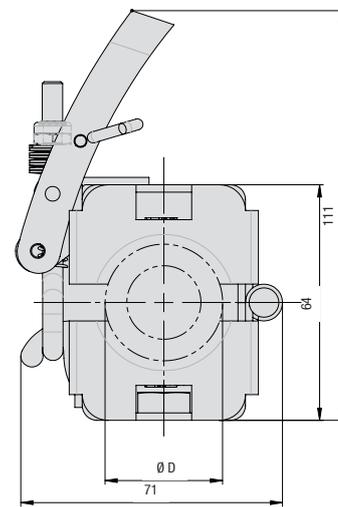
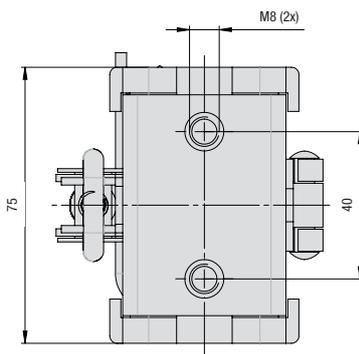
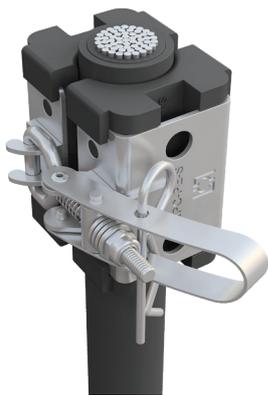
Wind power clamp for fastening three cables Type WPC-S



Main features

- The design and materials conform to the latest wind power plant construction requirements in compliance with common short circuit testing according to DIN EN 61914 (VDE 0604-202):2010-01.
- Excellent UV stability of the clamp body; resistant to salt water, rain and oil
- Suitable for continuous use at temperatures of -45 °C to +90 °C or -49 °F to +194 °F
- **1** Steel clamp body, zinc/nickel-coated or V4A stainless steel; for fastening cables with a swivel arm
- **2** Replaceable flexible elastomer cable holder for consistent retention forces (compensates for the cable tolerance) also doubles as cable protection for common cable diameters and types.
- Elastomer insert also available in flame-retardant special material, tested and approved to UL94.
- **3** Quick-clamping system for the simple and fast fitting of power cables without tools
- Significant time-savings in terms of installation (compared to other designs)
- **4** Spring package to maintain pre-tension
- **5** Spiral spring for ease of operation when opening/closing the closure with the U-bolt
- **6** Securing lock
- **7** Adjusting nut for the simple adjustment of the cable diameter
- **8** Weld nuts with M8 thread for direct screw fixing
- **9** Suitable for all common cable diameters between 22 mm and 38 mm
- Alternative outer diameters are available on request

Wind power clamp for fastening one cable
WPC-PE-S clamp body



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Ordering key

Clamp body

***WPC-PE-S-*01-*34/30-*71-
 *SA-64SH-*HV-*W3-*A**

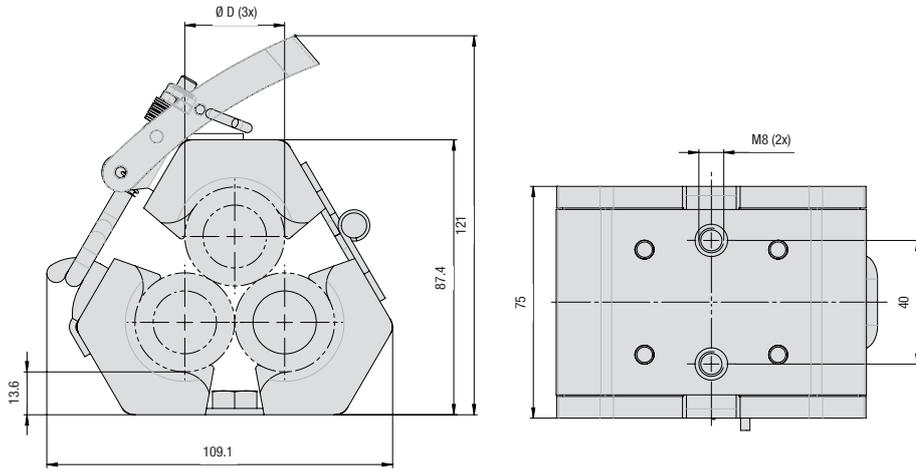
Comprising a clamp body for fastening cables with a swivel arm, each with two elastomer inserts.

* Clamp type	WPC-PE-S
* Number of cable brackets	01
* Max./Min. cable diameter	34/30
* Max. clamp length	71
* Elastomer insert	SA-64SH
* Smooth with pre-tension	HV
* Material Steel, zinc/nickel-coated	W3
V4A stainless steel-	W5
1.4571 (AISI 316 Ti)	
* Supplied assembled	A

Max./Min. cable diameter (mm)	Order description Max./Min. cable diameter	Dimensions (mm/in) Elastomer insert ØD
26/22	26/22	24 .94
30/26	30/26	28 1.10
34/30	34/30	32 1.26
38/34	38/34	36 1.42

Inserts for alternative outer diameters are available on request.
 Please contact STAUFF for more information.

Wind power clamp for fastening three cables
WPC-S clamp body



Max./Min. cable diameter (mm)	Order description Max./Min. cable diameter	Dimensions (mm/in) Elastomer insert ØD
26/22	26/22	24 .94
30/26	30/26	28 1.10
34/30	34/30	32 1.26
38/34	38/34	36 1.42

Inserts for alternative outer diameters are available on request.
Please contact STAUFF for more information.

Ordering key

Clamp body

***WPC-S-*03-*32.5/31-*109.1-
*SA-64SH-*HV-*W3-*A**

Comprising a clamp body for fastening cables, with a swivel arm, each with two elastomer inserts.

* Clamp type	WPC-S
* Number of cable brackets	03
* Max./Min. cable diameter	32.5/31
* Max. clamp length	109.1
* Elastomer insert	SA-64SH
* Smooth with pre-tension	HV
* Material Steel, zinc/nickel-coated	W3
V4A stainless steel- 1.4571 (AISI 316 Ti)	W5
* Supplied assembled	A