



## Products for wind turbines

carbon products & supplies for industry



# Products for wind turbines

## Special slip ring systems for increased efficiency and improved performance of wind turbines

Wind power generators up to 6 megawatts use Carbonex technology. Carbonex supplies slip rings units, brush holders and rockers with great performance, capacity and reliability, using a special sliding devices for safe electrical contact.

Carbonex supplies customized units for asynchronous slip-ring generators, lightning protection and grounding systems as well as carbon brush materials especially developed with regard to environmental conditions. We guarantee less maintenance efforts, low costs and therefore increased operating efficiency.

- Slip ring unit and brushes for wind power generators
- Power Brushes
- Grounding Brushes
- Lightning Protection Brushes
- Brush Holder
- Carbon Brush
- Pitch Control
- Earthing Roller for Lightning Protection and Grounding
- Shaft Grounding
- Brush Rockers in customized design for generators
- Special Brush Rockers for 3.4 MW generators with radial blowers
- Slip Rings up to 1,500 A and more than 3,000 rpm over speed



# Products for wind turbines

## Carbon Brush

Carbonex is one of the biggest supplier on the market for slip ring units for double fed asynchronous generators, lightning protection and grounding systems as well as carbon brush materials especially developed with regard to environmental conditions. They guarantee less maintenance efforts, low costs and therefore increased operating efficiency.



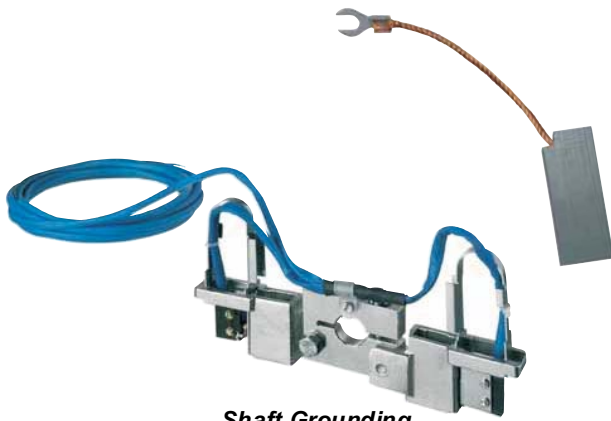
*Brush Holder*



*Carbon Brush*

## Carbonex manufactures for Wind Turbines

- Carbon Brushes
- Brush Holders
- Brush Rockers
- Slip Rings
- Lightning Protection Systems
- Shaft Grounding Units (also for Synchronous Generators)
- Flexible Current Connectors



*Shaft Grounding*



*Lightning Protection Brushes*



*Pitch Control*



*Earthing Roller for Lightning Protection and Grounding*

# Products for wind turbines



**Brush Rockers**  
*in customized design for generators*



**Special Brush Rockers for 3.4 MW generators with radial blowers**



**Slip Rings**  
*up to 1,500 A and more than 3,000 rpm over speed*



**Power Brushes**



**Grounding Brushes**



**Lightning Protection Brushes**



carbon products & supplies for industry



## Grade Recommendations –Wind Power

### Wind Generators

Grade	Metal content %	Optimal permanent current density		Max. Permanent speed		Remarks
		A/in <sup>2</sup>	A/cm <sup>2</sup>	ft/s	m/s	
C72	28	92	14	131	40	For electrical loads
A41X	37	118	18	131	40	For low humidity
A24X	40	118	18	131	40	Standard grade, ring saving
C80	53	131	20	115	35	Suitable for brass, bronze and steel rings
C80X	53	131	20	115	35	Improved wear resistance
S13	60	144	22	115	35	Lowest electrical losses
K14Z3	63	144	22	115	35	Low electrical losses
E43	-	65	10	164	50	For carbon / carbon units

\* On helically grooved rings only

### Shaft Grounding

Grade	Metal content %	Optimal permanent current density		Max. Permanent speed		Remarks
		A/in <sup>2</sup>	A/cm <sup>2</sup>	ft/s	m/s	
A24X	40	-	-	131	40	Standard for 4th ring (steel)
S13/F19	60/-	-	-	115	35	Sandwich design, standard combination
B14	90	-	-	115	35	Excellent film control
C40Z3	75	-	-	115	35	Excellent film control

Lightning protection - Schunk designs are approved up to 150 kA  
(with special spark gap bracket up to 200 kA)

Grade	Metal content %	Optimal permanent current density		Max. Permanent speed		Remarks
		A/in <sup>2</sup>	A/cm <sup>2</sup>	ft/s	m/s	
A20	50	-	-	-	-	Standard grade
K14Z3	63	-	-	-	-	Standard grade
C40Z3	75	-	-	-	-	For polluted ambience
E43	-	-	-	-	-	For offshore application

### Pitch Control

Grade	Metal content %	Optimal permanent current density		Max. Permanent speed		Remarks
		A/in <sup>2</sup>	A/cm <sup>2</sup>	ft/s	m/s	
E46X	-	78	12	164	50	Standard grade
E105	-	78	12	164	50	Improved commutation





[www.carbonex.gr](http://www.carbonex.gr)

VASILIADIS BROS  
Carbon Brushes & Trading of Brush Holders

18 Attalias Str. -P.O. 142 31  
N. IONIA, ATHENS, GREECE

Tel: (+30) 210.27.56.961  
Fax: (+30) 210.27.76.637

e-mail: [carbnext@yahoo.gr](mailto:carbnext@yahoo.gr) | [carbonex@carbonex.gr](mailto:carbonex@carbonex.gr)