StrikeTape SR
High-Current Test Results
Test report

The report presents test results from a High Current conducted test on WXGuard lightning diverters utilizing 0.06 inch diameter buttons.

Report No.: 20313-06 V3_0
Date: 2014-05-22

Company, Distributor & Branding Update

Pinnacle Lightning Protection, LLC (DBA Weather Guard Lightning Tech) manufactures and distributes StrikeTape lightning diverters, formerly known as WXGuard.

- StrikeTape diverters, at the time of this report, were branded as “WXGuard.”

- Shine Wire, Inc. is no longer a distributor of StrikeTape products.

- All inquiries should be directed to the Weather Guard Lightning Tech customer service team, who exclusively manufacturers StrikeTape products.
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1 Administrative Data

Date of Test: 23rd of April 2014

Customer: Shine Wire Products, Inc.

Contact Person: Greg Shine

Test conducted by: Boas Eiriksson, Global Lightning Protection Services A/S

Equipment under test: WXGuard segmented lightning diverters with 0.06 inch diameter buttons, Part number 100-100620-0-SR-EDG-NC-400

Test location: Global Lightning Protection Services A/S
HI Park 445
7400 Herning
Denmark

Test purpose: The test is intended to verify the performance when subjected to lighting currents of the LPL1 level in IEC 61400-24.

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Signature: Boas Eiriksson
Global Lightning Protection Services A/S

Review: Søren Find Madsen
Global Lightning Protection Services A/S

<table>
<thead>
<tr>
<th>Document version</th>
<th>Version date</th>
<th>Revised due to</th>
<th>Written by</th>
</tr>
</thead>
<tbody>
<tr>
<td>V3_0</td>
<td>2014.05.22</td>
<td>Editorial changes</td>
<td>KB</td>
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<tr>
<td>V2_0</td>
<td>2014.04.29</td>
<td>Editorial comments corrected and new method of calculating the charge content</td>
<td>SFM</td>
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<td>V1_0</td>
<td>2014.04.24</td>
<td>First version</td>
<td>BE</td>
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</table>

Table 1 – Revision overview.
2 Executive Summary

The present report presents the tests and results of impulse current testing of WXGuard lightning diverters with 0.06 inch diameter buttons. The aim of the test was to inject impulse currents with specific energies within the tolerances of IEC 61400-24 LPL1.

Three samples of Part number 100-100620-0-SR-EDG-NC-400 diverters, each of 10cm length and 1 inch gap from where the arc initiates, were tested. All buttons on every sample on the diverter strip were intact after the tests; hence the test samples passed the LPL1 lightning current test according to IEC 61400-24.
3 Introduction
The present test report covers a High Current test performed on three samples of WXGuard lightning
divers with 0.06-inch diameter round buttons, installed on a glass fibre panel with 1 inch gap to where the
arc initiates. The diverter part number was 100-100620-0-SR-EDG-NC-400.

4 Test and Measurement Equipment
The test equipment for the impulse current test was a 200kA crowbar generator. The primary measurement
system consisted of a PEMUK Rogowski Coil CWT 1500, which can measure transient currents from 15A to
300kA, at frequencies between 0.03Hz and 16 MHz (3dB bandwidth). The signal from the Rogowski Coil
amplifier was recorded by a Tektronix Oscilloscope TDS1001B, controlled and analysed by a National
Instruments Labview Code.

The waveform produced by the generator depends on the impedances of the specimen, but can for low
resistance samples be shaped within the tolerances of a 10/350µs waveform.

For the first return stroke waveform described in IEC 61400-24, the tolerances of peak current, charge and
specific energy are as follows:

- Peak current ±10%
- Charge ±20%
- Specific energy ±35%

Due to the nature of the test samples, the peak currents and specific energies could only be achieved by
using damped oscillating pulses. The consequence is that the peak current is slightly above the tolerances
specified in IEC 61400-24, whereas the specific energies are well within the tolerances.

5 Test Specification
Three current pulses are injected in each test samples, all aiming at the desired test level of LPL1 in IEC 61400-
24. The performance for the lightning diverter is determined by the number of buttons removed by the
lightning impact, and the diverter is said to fail if three or more buttons are removed from the diverter strip.
The success criteria for the waveform is reached if the specific energy is reached within IEC 61400-24
tolerances.

6 Equipment under Test
Three samples of 10 cm diverter strip with round 0.060 inch button, placed with 1 inch gap from where the
arc initiates are tested. Each of the samples are connected to the test generator as seen on Figure 1, where
the high terminal of the generator is connected to the bolt on the right side, and the low terminal is
connected directly to the lightning diverter.
7 Test Results

The test results are presented in Table 2 through Table 4. All tests are performed with a damped oscillating waveform. Since the charge impact to the lightning diverters does not depend on the current direction, it is decided to calculate the charge content in the waveform based on the absolute value of the injected oscillating current.

![Test sample 3 installed to the generator, 10 cm diverter strips section attached on a glass fibre panel with 1-inch gap in one end.](image)

### Table 2 – Test results of sample 1.

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Test sample</th>
<th>$I_{\text{peak}}$ Measured [kA]</th>
<th>Specific Energy [MJ/Ω]</th>
<th>Absolute Charge [C]</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>230</td>
<td>7.8</td>
<td>64</td>
<td>All buttons intact after the discharge.</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>231</td>
<td>7.9</td>
<td>64</td>
<td>All buttons intact after the discharge.</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>227</td>
<td>7.7</td>
<td>63</td>
<td>All buttons intact after the discharge.</td>
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</table>

### Table 3 – Test results of sample 2.

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Test sample</th>
<th>$I_{\text{peak}}$ Measured [kA]</th>
<th>Specific Energy [MJ/Ω]</th>
<th>Absolute Charge [C]</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>227</td>
<td>8.2</td>
<td>64</td>
<td>All buttons intact after the discharge.</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>227</td>
<td>8.4</td>
<td>71</td>
<td>All buttons intact after the discharge.</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>230</td>
<td>8.3</td>
<td>68</td>
<td>All buttons intact after the discharge.</td>
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</tbody>
</table>
Table 4 – Test results of sample 3.

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Test sample</th>
<th>$I_{\text{peak}}$ Measured [kA]</th>
<th>Specific Energy [MJ/Ω]</th>
<th>Absolute Charge [C]</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>230</td>
<td>8.6</td>
<td>72</td>
<td>All buttons intact after the discharge.</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>226</td>
<td>8.2</td>
<td>68</td>
<td>All buttons intact after the discharge.</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>228</td>
<td>7.9</td>
<td>66</td>
<td>All buttons intact after the discharge.</td>
</tr>
</tbody>
</table>

Image before and after the tests of sample 3 is shown on the following figures.

Figure 2 – Left: Sample 3 before all tests. Right: Sample 3 after the first test.

Figure 3 – Left: Sample 3 after the second test. Right: Sample three after the third test.

Figure 4 – Sample 3 after all three tests, with all buttons intact.
8 Test Conditions
The ambient temperature, humidity and pressure were logged during tests and the maximum and minimum values are shown in Table 5.

<table>
<thead>
<tr>
<th>Date</th>
<th>Temp [°C]</th>
<th>Pressure [mb]</th>
<th>Humidity [%]</th>
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<td>2014.04.23</td>
<td>16.2 – 17.5</td>
<td>1020 - 1022</td>
<td>57 - 61</td>
</tr>
</tbody>
</table>

Table 5 - Maximum and minimum ambient condition during the tests.

9 Images
A total of 72 images were captured during the tests and are provided for download.
ABOUT THE COMPANY

• CEO Allen Hall is an FAA Designated Engineering Representative (DER) for Lightning Direct Effects

• In 2006, Weather Guard Lightning Tech was incorporated.

• StrikeTape lightning diverters were developed in 2011 and are in use all over the world.


• Weather Guard Lightning Tech is the Original Equipment Manufacturer of StrikeTape.

• Give our customer service team a call today!
We Make Lightning Protection Easy

Contact Us Today

General Inquiries

📞 413.217.1139
✉️ info@wglightning.com

Engineering

📞 413.217.1176
✉️ allen.hall@wglightning.com

Accounting

📞 413.217.1178
✉️ valerie.hall@wglightning.com

Customer Service

📞 413.217.1178
✉️ dan.blewett@wglightning.com

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