



# Rain Erosion Testing

ASTM G73-10 & DNV-RP-0171



A wind turbine blade is subject to continual wear during its lifetime – exposed to sunlight and a constant collision with e.g., raindrops, dust particles, or hailstones. Strong resistance to this highly corrosive exposure is crucial for the protective surface of the blade, particularly the highly exposed leading edge. With rain erosion tests, you can gain insight into the durability of your leading edge protection solution, so you can maximize lifespan, fulfill guarantees, and control your costs.

## Superior testing

Turbines are installed in many different, constantly changing environments. This makes it impossible to simulate the environmental impact on all sites. Our Test & Validation Center offers rain erosion tests on a three-bladed system that rotates 45 cm test specimens\* shaped like the leading edges of turbine blades. The system generates adjustable rainfalls from 600 nozzles\* and ensures simulations for realistic weather conditions for accelerated tests.

## Complies with international standards and best practices

Our accredited Test & Validation Center conducts tests according to the ASTM G73-10 standard and the DNV-RP-0171.

The ASTM G73-10 test is widely accepted as the most suitable method to evaluate the erosive properties of materials applied to the leading edge of wind turbine blades. As specified by the standard, we carry out a reference test every four weeks to ensure the testing quality.

\*Test setup according to the DNV-RP-0171.

## POLYTECH TEST & VALIDATION ADVANTAGES

- Accredited according to ISO 17025
- Able to combine different test methods in-house
- Able to adapt new standards
- For combined test, an individual test plan is produced
- Designated customer area at your disposal if you wish to attend your test sequence
- Highly-qualified staff



600 nozzles simulate realistic rainfall with adjustable droplet size.

Our reliable setup ensures documented repeatability and meets DNV's recommended practice (RP-0171) as well, which is perceived as standard in the industry. As specified by this practice, we perform a calibration after changing critical test parameters and after every 2 months.

## Unique options for combination of test sequences

We can also combine rain erosion tests with other weathering tests and put together fully customized test programs for you. With these, you can simulate the environmental effects on your blades and your leading edge protection solutions as accurately as possible.

An example of such combined tests could be an accelerated weathering test, like ISO 12944-9 for offshore environments, consisting of:

- 3 days exposure to simulated sunlight and moisture (ISO 16474-3/ISO 16474-2)
- 3 days salt spray (ISO 9227)
- 1 day at low temperature (-20°C)

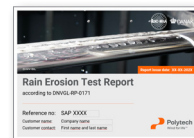
We can adjust this or other test sequences to your needs.

## Typical test procedure

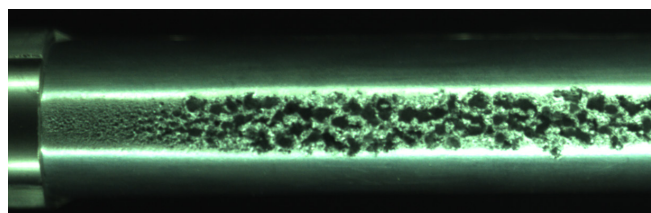
We supply GFRP profiles for your rain erosion tests. You coat these profiles with your leading edge protection materials, and then send us the specimens. We mount the specimens in the rain erosion test setup and accelerate them up to a speed that you define (typically 160 m/s at the tip).

When the defined speed is reached, the nozzles simulate droplets and rainfall intensities as defined by the standard or your requirements. We interrupt the test every 30 minutes, or per your instructions, to take high-resolution images documenting the erosion process.

Finally, we combine the high-resolution images and data from the test setup in a Test Report, which we send to you.

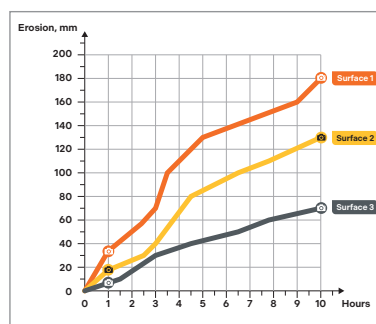


	ASTM G73-10	DNV-RP-0171
<b>Droplet size</b>	1-2 mm	2 - 2.5 mm or 3 - 3.5 mm
<b>Rain intensity</b>	30-35 mm/h	20-73 mm/h
<b>Water flow</b>	40-50 l/h	60 - 70 l/h or 120 - 150 l/h
<b>Water temperature</b>	Not controlled	8°C - 16°C
<b>Test room temperature</b>	20-25°C	18-25°C
<b>Maximum tip speed</b>	160 m/s (1,279 RPM)	173 m/s (1,382 RPM)
<b>Image options</b>	<ul style="list-style-type: none"> <li>• Manual high-resolution images with high contrast setup</li> </ul>	<ul style="list-style-type: none"> <li>• Manual high-resolution images with high contrast setup</li> <li>• Automatic high-resolution images (20 MP)</li> </ul>
<b>Adjustable parameters</b>	<ul style="list-style-type: none"> <li>• Test duration</li> <li>• Interval between photos</li> <li>• Test speed</li> </ul>	<ul style="list-style-type: none"> <li>• Test duration</li> <li>• Interval between photos</li> <li>• Test speed</li> <li>• Water flow</li> <li>• Rain intensity</li> </ul>



High-resolution image of uncoated aluminium specimen at the tip end.

## Suggested evaluation of test results



One way to evaluate the images obtained from the rain erosion test is by converting them to a graph that shows the evolution of the erosion. You can analyze the images by measuring the erosion depth

[mm] throughout the testing period.

## Independent third-party testing

Our Test & Validation Center is accredited by DANAK according to ISO 17025 and acts as an impartial third-party test institute.