

ICE DETECTION SYSTEM

# Certification Report

## Ice Detection System

### IDD.Blade

Wölfel Wind Systems GmbH


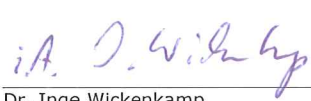

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**Date:** 2018-01-27



|  |                                |                               |
|--|--------------------------------|-------------------------------|
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| Report title:  | Certification Report           | Renewables Certification      |
|  | Ice Detection System IDD.Blade | Germanischer Lloyd Industrial |
| Customer:  | Wölfel Wind Systems GmbH       | Services GmbH                 |
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| Applicable contract(s) governing the provision of this Report: |                                |                               |

Objective:  
 Recertification of Ice Detection System IDD.Blade

|   |   |   |
|---|---|---|
| Prepared by:  | Verified by:  | Approved by:  |
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Appendix A Ice Detection System IDD.Blade

## 1 EXECUTIVE SUMMARY

The ice detection system "IDD.Blade" is a system, installed in the rotor blades of a wind turbine, which allows the detection of ice under icing conditions.

The ice detection system IDD.Blade was certified in 2016-01-27 according to GL-IV-4:2013 "Guideline for the Certification of Condition Monitoring Systems for Wind Turbines". For the current recertification the ice detection system was assessed on the basis of DNVGL-SE-0439:2016-06.

The ice detection system "IDD.Blade" complies with the requirements listed in DNVGL-SE-0439:2016-06 "Certification of condition monitoring".

## 2 CERTIFICATION SCHEME

| Document No.          | Title                                 |
|-----------------------|---------------------------------------|
| DNVGL-SE-0439:2016-06 | Certification of condition monitoring |

## 3 LIST OF REPORTS

The Appendix to this report comprises the detailed DNV GL evaluation report which normally includes reference standards/documents, list of design documentation as well as summary and conclusion of the DNV GL evaluation.

| APPENDIX | Revision | Subject                        |
|----------|----------|--------------------------------|
| A        | 0        | Ice Detection System IDD.Blade |

## 4 CONDITIONS

No conditions.

## 5 OUTSTANDING ISSUES

No outstanding issues.

## 6 CONCLUSION

The ice detection system "IDD.Blade" was assessed on the basis of DNVGL-SE-0439:2016-06 "Certification of condition monitoring".

The ice detection system "IDD.Blade" complies with the requirements listed in DNVGL-SE-0439:2016-06 "Certification of condition monitoring".

Any modifications to the function mode will render the present report invalid, if they are not approved by DNV GL.

## APPENDIX A

### Ice Detection System IDD.Blade

#### Assessment of Ice Detection System IDD.Blade

##### Description of the condition monitoring system

The ice detection system "IDD.Blade" is a system, installed in rotor blades of wind turbine, which allows the detection of ice under icing conditions. The ice detection is based on measuring of accelerations and temperature direct on a rotor blade.

##### Interface to other systems/components

- Rotor blade.

##### Basis for the evaluation

Applied codes and standards:

| Document No.  | Revision | Title                                 |
|---------------|----------|---------------------------------------|
| DNVGL-SE-0439 | 2016-06  | Certification of condition monitoring |

##### Documentation from customer

List of reports:

| Document No. | Revision | Title |
|--------------|----------|-------|
| -,-          |          |       |

List of drawings:

| Document No. | Revision | Title |
|--------------|----------|-------|
| -,-          |          |       |

List of specifications/manuals/instructions:

| Document No.    | Revision | Title  |
|-----------------|----------|--|
| SHMB-02-PS-IDD  | 1        | Produktspezifikation IDD.Blade   |
| SHMB-02-SP_NX   | 4        | Schaltpläne SHM.Blade  |
| RD-29-00-08-001 | 1.1      | Structural Noise Sensor SNS (S1) Datasheet, by Micromega Dynamics                            |
| RD-29 SNS       | 1.0      | Structural Noise Sensor SNS 6 Datasheet, by Micromega Dynamics                               |
| SHM.DAQ-EN      | 1.0      | 24-bit 24-Channel Acquisition System for Structural Health Monitoring, by Micromega Dynamics |
| SHMB-02-DB-CB   | 3        | Datenblatt Connection Box (CB)   |
| SHMB-02-DB-DAU  | 5        | Datenblatt Data Acquisition Unit (DAU)   |
| SHMB-01-DB-DPU  | 4        | Datenblatt Data Processing unit (DPU)  |

| Document No.                      | Revision | Title  |
|-----------------------------------|----------|--|
| SHMB-02-DB-DPU                    | 5        | Datenblatt Data Processing unit (DPU)  |
| SHMB-01-Schwellen-eiserkennung    | 1        | IDD.Blade Parametrisierung der Schwellenwerte zur Eiserkennung                   |
| SHMB-02-Anleitung Inbetriebnahme  | 8        | Inbetriebnahmeanleitung SHM.Blade / IDD.Blade                                    |
| SHMB-02-Protokoll Inbetriebnahme  | 5        | Inbetriebnahmeprotokoll SHM.Blade / IDD.Blade                                    |
| SHMB-02 Anleitung Montage Wartung | 6        | Montage- und Wartungsanleitung SHM.Blade   |
| SHMB-02-Protokoll Montage DAU     | 4        | Montageprotokoll SNS SHM.Blade / IDD.Blade                                       |
| SHMB-02-Protokoll Inbetriebnahme  | 7        | Inbetriebnahmeprotokoll SHM.Blade  |
| SHMB-02-Protokoll Montage DAU     | 2        | Montageprotokoll DAU SHM.Blade / IDD.Blade                                       |
| SHMB-02-Protokoll Montage DPU     | 4        | Montageprotokoll DPU SHM.Blade / IDD.Blade                                       |
| SHMB-02-Protokoll Wartung         | 2        | Wartungsprotokoll SHM.Blade / IDD.Blade  |
| -                                 | -        | Beabsichtigtes Vorgehen zum Funktionsnachweis                                    |
| SHMB-01-expnach                   | 3        | Testspezifikation Experimenteller Nachweis zur Erkennung von Massenveränderungen |
| SHMB-02-Kommunikation mit WEA     | 1        | Kommunikation von Betriebs- und Umweltdaten mit der WEA                          |

List of documents taken for information only:

| Document No.      | Revision               | Title  |
|-------------------|------------------------|--|
| 04 100 020955-001 | Valid until 2020-05-04 | Certificate of Approval according to ISO 9001:2015, by TÜV NORD CERT |


## Assessment work

The ice detection system "IDD.Blade" incl. software, sensors and the operating method was assessed on the basis of DNVGL-SE-0439:2016-06 "Certification of condition monitoring".

The documents were assessed for compliance with the regulations in DNVGL-SE-0439:2016-06.

The system test was performed at the Nordex plant in Rostock, Germany on a rotor blade NR 37 with weights attached to the rotor blade to simulate ice on 2013-10-15. The installation on a wind turbine was assessed on a Nordex N117 (serial no. NX 82409) in Remlingen, Germany on 2013-10-01 according to GL-IV-4:2013. The independent functioning of the safety equipment was examined by the interconnection diagram and the system test.

- This report covers the function of ice detection only up to that point, that the status is submitted to the operator. Every following action is within the responsibility of the operator.
- After an alarm received, the operator (owner) of the wind turbine shall be informed immediately.
- A possible interconnection between the ice detection system "IDD.Blade" and the operating system of the wind turbine is beyond the scope of this report.

- 
- The maintenance work listed in the maintenance instructions shall be properly carried out and the record shall be prepared and handed over to the operator / monitoring body.
  - Each ice detection system shall be set to work in accordance with the document for commissioning. The document for commissioning shall be handed over to the operator / monitoring body, together with the operating instructions.
  - Before using the ice detection system on rotor blades made of other materials than FRP further tests for the sensor application are necessary.
  - If repairs on a rotor blade have been carried out, a new calibration of the ice detection system is necessary.
  - The ice detection system “IDD.Blade” is not a substitute for a condition monitoring system but it is a reasonable add-on to an already DNV GL-certified condition monitoring system for wind turbines.
  - If the ice detection system shall be used for monitoring a wind park, it has to be installed on each wind turbine within the wind park.
  - When installing the ice detection system “IDD.Blade” in rotor blades with hydraulic pitch, it has to be assured that electrical connection is possible in the hub.

## Conditions

No conditions.

## Outstanding issues

No outstanding issues.

## Conclusion

The ice detection system “IDD.Blade” was assessed on the basis of DNVGL-SE-0439:2016-06 “Certification of condition monitoring”.

The ice detection system “IDD.Blade” complies with the requirements listed in DNVGL-SE-0439:2016-06 “Certification of condition monitoring”.

Any modifications to the function mode will render the present report invalid, if they are not approved by DNV GL.



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