UL 4143

Outline of Investigation for Wind Turbine Generator – Life Time Extension (LTE)

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Summary of Topics

This first issue of the Outline of Investigation for Wind Turbine Generator -Life Time Extension (LTE), UL 4143, defines the requirements for the life time extension of wind turbines.

These requirements are intended to facilitate a wide spectrum of assumptions and methods in the process of obtaining external conditions, technical characteristics and the calculation of the remaining useful life time of wind turbines and the confidence level on failure mode to the risk describing the uncertainty in the used methods and procedures. Commercial aspect of wind farm operation is not covered by these requirements.

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INTRODUCTION

1 Scope

1.1 These requirements cover the rules and procedures for the life time extension of wind turbines (LTE).

1.2 These requirements covers the process to obtain risk by relating the severity to their confidence level on accuracy for the failure mode.

1.3 Commercial aspects of wind farm operation are not covered by this Outline of Investigation.

1.4 These requirements are applicable to the on-shore wind turbines.

2 Glossary

2.1 For the purpose of this document, the following terms and definitions apply. Further definitions can also be found in IEC 61400 series.

2.2 CELL – Grouping of wind turbines. A cell defines a group of wind turbines within a wind farm.

2.3 FL – Fatigue load on component

2.4 LTE – Life time extension, a technical assessment that supports the continued use of a wind asset beyond a previously determined time-based limitation.

2.5 MCP – Measure-correlate-predict

2.6 MLC – Measurement load case

2.7 OEM – Original equipment manufacturer

2.8 RPN – Risk priority number, the RPN level of uncertainty in failure mode.

NOTE: This RPN calculation differs from the method mentioned in Analysis techniques for system reliability – Procedure for failure mode and effects analysis (FMEA), IEC 60812

2.9 RUL – Remaining useful life, the time frame of a safe operation of wind turbine(s) or a wind farm.

2.10 SCADA – Supervisory control and data acquisition.

2.11 WTG – Wind turbine generator

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3 Units of Measurement

3.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

4 Undated References

4.1 Any undated reference to a code or standard appearing in the requirements of this Outline of Investigation shall be interpreted to the latest edition of that code or standard.

Table 4.1
Normative references

No.	Document number	Title
1	IEC 61400-1	Wind turbines – Part 1: Design requirements
2	IEC 61400-12-1	Wind turbines – Part 12-1: Power performance measurements of electricity producing wind turbines
3	IEC 61400-22	Wind turbines – Part 22: Conformity testing and certification
4	ISO/IEC 17020	General criteria for the operation of various types of bodies performing inspection
5	ISO/IEC 17025	General requirements for the competence of testing and calibration laboratories
6	ISO/IEC 17065	Conformity assessment - Requirements for bodies certifying products, processes and services
7	ISO 13849	Safety of machinery – Safety related parts of control systems
8	GL	Guideline for the Certification of wind turbines
9	UL 6142	Small Wind Turbine Systems
10	UL 6141	Large Wind Turbine Systems
11	IEC 60812	Analysis techniques for system reliability – Procedure for failure mode and effects analysis (FMEA)
12	IEC 61400-13	Wind turbines – Part 13: Measurement of mechanical loads

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