



# UL 4143

## STANDARD FOR SAFETY

### Wind Turbine Generator – Life Time Extension (LTE)

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UL Standard for Safety for Wind Turbine Generator – Life Time Extension (LTE), UL 4143

First Edition, Dated February 9, 2018

### **Summary of Topics**

***This First Edition of ANSI/UL 4143, the Standard for Wind Turbine Generator – Life Time Extension (LTE), covers requirements for the rules and procedures for the life time extension of wind turbines (LTE).***

The new requirements are substantially in accordance with Proposal(s) on this subject dated June 2, 2017 and December 15, 2017.

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FEBRUARY 9, 2018

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ANSI/UL 4143-2018

UL 4143

Standard for Wind Turbine Generator – Life Time Extension (LTE)

First Edition

February 9, 2018

This ANSI/UL Standard for Safety consists of the First Edition.

The most recent designation of ANSI/UL 4143 as an American National Standard (ANSI) occurred on February 9, 2018. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page.

Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at <https://csds.ul.com>.

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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 cover 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 DEL– Damage equivalent load
- 2.4 DLC – Design load case
- 2.5 FL – Fatigue load on component
- 2.6 LDD – Load duration distribution
- 2.7 LTE – Life time extension, a technical assessment that supports the continued use of a wind asset beyond a previously determined time-based limitation.
- 2.8 MCP – Measure-correlate-predict
- 2.9 MLC – Measurement load case
- 2.10 OEM – Original equipment manufacturer
- 2.11 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
- 2.12 RUL – Remaining useful life, the time frame of a safe operation of wind turbine(s) or a wind farm.
- 2.13 SCADA – Supervisory control and data acquisition.

## 2.14 WTG – Wind turbine generator

### 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                                            |
| 13  | TR6             | Technical Guidelines for Wind Turbines                                                              |
| 14  | MEASNET         | Evaluation of Site-Specific Wind Conditions                                                         |