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**INDUSTRY STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

DL/T 345-2019

**Application guidelines of UV diagnostic technology for live
electrical equipment
(English Translation)**

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1 Scope

This standard specifies the on-site detection requirements, detection methods, determination of discharge defect types and detection results diagnosis, defect severity's classification and handling, detection cycle, instrument and data management requirements, for the application of ultraviolet imaging technology, to the diagnosis of corona discharge of live electrical equipment.

This standard applies to the corona discharge detection and defect diagnosis, for high-voltage live electrical equipment (mainly including equipment conductors and insulator surfaces), which is caused by various reasons, using an ultraviolet imager.

2 Normative references

The following documents are essential for the application of this document. For dated references, only the dated version applies to this document. For undated references, the latest edition (including all amendments) applies to this document.

GB 26859 Safety code of electric power industry - Part of electric lines

GB 26860 Safety code of electric power industry - Electric part of power plants and transformer substations

DL/T 298 Guide for detection and evaluation of corona defects on stator winding overhangs of generator

DL/T 1779 Specification of ultraviolet imager for corona discharge detection in high voltage electrical equipments

3 Terms and definitions

The following terms and definitions apply to this document.

3.1

Gain and work site.

4.2 Safety requirements

The safety requirements are as follows:

- It shall strictly comply with GB 26859 and GB 26860;
- It shall strictly abide by the patrol requirements of the power plant, substation (converter station), line;
- There shall be a special person for monitoring.

4.3.1 General detection requirements

The general detection requirements are as follows:

- The equipment to be tested is a live electrical equipment; it shall avoid the obstructions that affect the detection, as much as possible;
- Detection shall not be performed under severe weather and environmental conditions (such as lightning, heavy rain, etc.);
- The wind class should not be higher than class 4. Please refer to Appendix A, for the identification of wind class and wind speed.

4.3.2 Requirements for accurate detection

In addition to meeting the general detection requirements, the following requirements shall also be met:

- The wind class should not be higher than class 3;
- Try to eliminate or reduce the influence of electromagnetic interference or other factors, on the measurement of the instrument.

4.4 Instrument requirements

Meet the requirements of DL/T 1779 standard.

5.1 General detection

Turn on the UV imager. Set the appropriate gain, to make the image clear and stable.

Then start to conduct a large-area patrol inspection of the equipment and corona discharge, to find out the equipment, parts and the intensity of the discharge.

5.2 Accurate detection

Accurately locate the discharge site. Obtain the visible light photos and discharge characteristics of the discharge equipment, including the number of discharge photons, discharge form, frequency and corona discharge intensity on the surface of the insulator, etc. The requirements are as follows:

a) General requirements:

- 1) Within the range allowed by the safety distance, when the image content is complete, the UV imager should be as close as possible to the detected equipment, to maximize the corona discharge area of the detected equipment, within the field of view; measure and record the distance from the UV imager to the corona discharge area;
- 2) In the positioning of the discharge position, the UV imager shall select the appropriate detection direction and angle, for the observation of the corona discharge part, to avoid other equipment blocking and discharge interference;
- 3) Make judgement of discharge characteristics in combination with Appendix B;
- 4) During the detection process, it shall record the parameters, such as instrument gain, ambient temperature/humidity, detection distance, focus state.

b) Recording of discharge pattern and frequency:

- 1) Adjust parameters such as instrument gain, to make the visual image clear. The video recording time shall be able to fully describe the discharge process; the recording time of

the discharge phenomenon, at each point, shall not be less than 5 s;

2) In the process of detecting the length form discharge, by detecting the range of repeated occurrence of corona discharge on the outer insulation surface of the equipment, estimate and record the remaining dry arc distance or the number of insulator sheets and sheds;

6.2.1 Average photon number method

Under the normalization principle of the number of 10 m photons, according to the average number of photons, the discharge intensity is divided into three ranges: high- intensity discharge, medium-intensity discharge, low-intensity discharge.

6.2.2 Image observation method

Judgment and defect classification are mainly based on the corona state, characteristic attribute, occurrence location, severity of the live electrical equipment in the image.

6.2.3 Same type comparison method

Evaluate the corona discharge status of live electrical equipment, by horizontally comparing the ultraviolet images of the corona discharge of the corresponding parts of the same model or the same type of live electrical equipment (which can include archival images of different periods, different weather, environments) OR the number of ultraviolet photons.

6.2.4 Comprehensive light image comparison method

Through the comparison with the infrared thermal image and visible light image of the equipment, which is corresponding to the corona discharge position, carry out the diagnosis and evaluation of the defects of the live electrical equipment.

6.3 Diagnosis of discharge detection results of defective equipment

See Appendix B for the diagnosis method of the discharge detection results of the main defective equipment.

7 Classification and handling of defect severity

According to the impact of corona discharge defects on the operation of live electrical equipment or power grid, it proposes different severity and treatment methods, for three categories of defects:

- Category 1: The equipment has low-intensity discharge, which does not affect the normal operation of the live electrical equipment. It will be observed later.
- Category 2: The equipment has medium-intensity discharge, which may affect the normal operation of the live electrical equipment. It shall increase the frequency of detection; carry