

ICS 27.020
CCS F 21

DL

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

DL/T 2030-2019

**Power transmission and transformation loop reliability
evaluation procedures**

输变电回路可靠性评价规程 清晰版
(English Translation)

Issued on: June 4, 2019

Implemented on: October 1, 2019

Issued by: National Energy Administration

Table of Contents

Table of Contents
Foreword
1 Scope
2 Terms and definitions
3 Circuit division and naming
4 Loop status
5 Loop evaluation index and calculation formula
6 Statistical evaluation requirements
Appendix A
Appendix B

Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009 "Guidelines for Standardization Work Part 1: Standard Structure and Compilation".

Please note that certain contents of this document may involve patents. The issuing agency of this document is not responsible for identifying these patents.

This standard was proposed by the China Electricity Council.

This standard is under the jurisdiction of the Power Industry Reliability Management Standardization Technical Committee (DL/T C31).

Drafting organizations of this standard. China Electricity Council, State Grid Co., Ltd., State Grid Hubei Electric Power Co., Ltd.

1 Scope

This standard specifies statistical indicators and evaluation methods for the reliability of power transmission and transformation circuits.

This standard applies to the reliability statistics of power transmission and transformation circuits of power transmission and power supply enterprises.

2 Terms and definitions

The following terms and definitions apply to this standard.

Circuit of transmission and transformation A set of components connecting two or more transmission terminals, substations, or system transmission nodes in a power transmission and transformation system Together, it is called the transmission and transformation loop (hereinafter referred to as the loop). The circuit includes three parts. substation circuit, transmission circuit and bus circuit.

The loop has the following functions.

- a) Transmission of electric energy from one end to the other within a specific capacity range;
- b) Provide a variable connection for the system;
- c) Under certain specific circumstances, it can automatically isolate itself from the entire power transmission and transformation system.

2.1.1

Transformation circuit with transformer as the main body, it is a collection of components that realize the function of electric energy conversion between different voltage levels. Line transformer group press change Statistics of electrical circuits are called line-transformation group transformation circuits.

2.1.2

Transmission circuit Take the transmission line as the main body to realize the set of components for power transmission between different points (substation, power plant or user) Together.

2.1.3

Bus circuit

A collection of components that connect two or more power transmission circuits and substation circuits to realize electric energy collection and distribution.

Number of circuit terminal the circuit itself belongs to realize the electrical connection and can complete all the terminals of the power transmission function.

Circuit relationship the active power transmission relationship between two interconnected circuits. The circuit correlation is divided into one-way according to the active power transmission direction and two-way. The network topology structure of the power transmission and transformation system can be formed through the loop correlation.

Number of circuit connection the sum of the number of other circuits connected to the circuit.

Number of circuit power supply the sum of the number of other circuits that are connected to the circuit and can provide active power to this circuit.

Circuit capacity

The sum of the rated capacity of each transformer in the substation circuit (in MVA).

Circuit length

The sum of the length of the overhead line and the cable line in the transmission circuit, and the sum of the length of the trunk line and the branch line (unit km).

Number of circuit

The number of loops in the power transmission and transformation system at the end of the statistical period.

Period hours

When the loop is in use, select the number of hours during the period according to statistical needs.

2.10

Statistical loop (km) year unit years the number of circuits (km) and years of the transmission and transformation system circuits during the statistical period, if the circuits were put into operation for less than one year during the statistical period it is converted according to actual time.

2.11

Circuit regional administrative level the management level of the unit to which all the components contained in the transmission circuit and the line-transformation group substation circuit belong. There are four levels of loop area the categories are the cross-network circuit (W), the cross-provincial circuit (S), the cross-regional city circuit (J) and the local circuit (B). Loop area the level is higher than or equal to the level of the line area it contains.

3.1 Principle of circuit division

The circuit division should conform to the following principles.

- a) A single element should belong to a loop at a point in time.
- b) The internal components of combined electrical appliances (including GIS, H-GIS, PASS, COMPASS, etc.) should be divided into in the corresponding loop.
- c) The circuit boundary components of the bus circuit, the substation circuit and the transmission circuit should be the components with breaking function, and the circuit boundary the components belong to the bus circuit.

3.2 Transformer circuit

3.2.1

The transformer body and the equipment within the boundary point of the bus circuit on each side (excluding the bus side isolating switch) are classified as transformer Electric circuit. The substation circuit of the line substation includes the equipment within the demarcation point of the line and the bus circuit of the substation on each side. Single-phase transformation the three-phase transformer group composed of transformers is counted as a substation loop. Statistics on AC side of converter transformer in DC converter station it is a substation loop, including the following situations.

- a) Conventional DC converter station (converter station of $\pm 660\text{kV}$ and below). the top wiring board of the grid-side bushing of each pole converter transformer all equipment between the connection points of the AC field bus circuit is defined as a substation circuit.
- b) Back-to-back DC converter station. the top wiring board of the grid-side bushing of the converter transformer on each side of each unit to the AC field bus bar of that side all devices between the connection points are defined as a substation circuit.
- c) UHV DC converter station ($\pm 800\text{kV}$ and above converter station). high-end (or low-end) converter transformer grid side of each pole all equipment between the wiring board at the top of the bushing and the connection point of the AC field bus circuit is defined as a substation circuit.

3.2.2

The substation circuit is named with "substation name" plus "voltage level" plus "transformer name", and the line substation circuit is named "Voltage level" plus "line name" is named.

3.3 Transmission circuit

3.3.1

The transmission line body and the equipment within the demarcation point of the bus circuit of the substation connected to each side (excluding bus side isolation Switch) is divided into transmission circuits.

3.3.2

The transmission circuit is named with "voltage level" plus "line name".

3.4 Bus circuit

3.4.1

All busbars of the same voltage level in the substation and the communication equipment between them, including the isolation that is directly connected to the busbar the