

An overview of the development of quality standards for electricity in Russia from 1997 to 2015

This theme is up-to-date because the electrical energy as a commodity is used in all spheres of human's activity. It has a set of specific properties and is directly involved in creating other types of products, affecting their quality. The concept of «power quality» differs from the concept of quality of other goods. Power quality manifests itself not directly but through the quality of electric receivers.

Currently, one can observe a tendency to tighten quality control in production in many industries. The growing needs dictate their requirements and the quality of electric power. The theme of power quality is also relevant in the space area in which the quality of all components is of paramount importance. Therefore the purpose of this article is to identify the major changes in the requirements for the quality of electricity in the last 20 years.

The objective of the article is to consider the basis on which the standards were created and their main changes. The method of comparison was used.

The basis for quality control of electricity consists of the following aspects:

- Standards for methods of measuring the parameters of quality of electric energy;
- The standard for organizing and conducting quality control electricity, which includes a form of reports;
- Standard quality electricity.

GOST 13109-97, the basic of electric energy quality, its normative values, steady voltage deviation and other parameters was developed by the Technical Committee for Standardization in the field of electromagnetic compatibility of hardware in 1997 [2].

Also in 2000 and 2002 there were developed and adopted «Guidelines for the monitoring and analysis of the quality of electric power supply systems, general purpose». It defined the procedure for control of electric energy quality. These standards became the basis for the creation of various control devices CE in Russia and CIS countries.

A few years later there was a need of such standards in Europe, where document IEC 61000-4-30 was received, which later became the main international standard. On its basis in Russia in 2008 a number of similar standards was adopted, and some of the provisions did not agree with the current GOST 13109-97, that led to the creation of a new standard GOST R 32144-2013 EC. It was introduced 1 July 2014 and it is the main standard of control electric energy quality in Russia nowadays. It was designed on the basis of all previous Russian and international instruments. On this basis, a number of devices, such as «Energotester SCE-A-AX», «Break-CE-A» and their modifications.

Table 1

Stages of development of the electric power system control in the Russian Federation

Year of publication	Name of standard
1997	GOST 13109-97
2000–2002	RD 153-34.0-15.502-2002 RD 153-34.0-15.501-00
2008	GOST R 51317.4.30-2008 GOST R 51317.4.7-2008 GOST R 53333-2008
2013	GOST R 54149-2010
2014	GOST R 32144-2013

If compare the old and the new GOST 13109-97 GOST R 32144-2013, it is possible to identify some basic differences:

- In contrast to GOST 13109-97 GOST R 32144-2013 procedure of control carried out on the basis of GOST R and GOST R 51317.4.30-2008 51317.4.7-2008. It is essential, because when these standards are used in conjunction, then it creates a unified system of requirements for maintaining control of CE. [1]

- The new standard has more stringent requirements for the averaging interval indicators CE. For example, if the frequency deviation – averaging interval is 10 seconds instead of 20 seconds as in the previous.

- In GOST R 32144-2013 introduced interharmonic voltage components. [1]

- The standard 2013 added to the classification table of voltage dips, interruptions and voltage surges.

- In accordance with GOST R 51317.4.30-2008 directly to GOST R 32144-2013 it introduced the concept of tagging data for the following categories of events: frequency deviation, slow changes in voltage, flicker, voltage unbalance, voltage harmonics. [1]

- An important difference between the old and new standards is the basis on which they were formed. GOST 13109-97 was created through the provisions of the first Soviet standards of the industry control. While the GOST R 32144-2013 already been developed on the basis of the modern world standards.

In conclusion, we can observe that the growing demands on the quality of electrical energy create the need for new standards. These standards are constantly being upgraded. In this article there were considered standards of quality of electric energy in Russia over the past 20 years.

References

1. Article entitled «Analysis of a new standard of quality of electric energy GOST R 54149-2010 in comparison with the old GOST 13109-97»
2. GOST R 32144-2013. Quality standards for electrical energy in power systems, general purpose
3. Standard 13109-97. Quality standards for electrical energy in power systems, general purpose

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