

RATIONALE FOR EXPOSURE HIGHER HARMONICS ELEMENTS OF ELECTRICITY AND QUALITY ELECTRIC POWER

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The quality of electricity - a set of properties, in which electrical appliances and devices can function properly, perform the functions contained in them.

Quality is determined by the standards and norms. European Committee for normalization in electrical engineering in 1994. was adopted and developed many standards, which normalized power quality parameters in different networks, including industrial, and determine the conditions of accession to the consumer networks.

The aim - to analyze the impact of higher harmonics of the elements of electricity supply and quality of electricity in distribution networks.

Materials and methods research. On the basis of the literature, the state of quality of electric energy in power systems. Determined the effects caused by deterioration of electricity, with special attention paid to higher harmonic components of current and voltage as the most difficult engineering evaluation factor.

Results. The main forms of action higher harmonic components of current and voltage in elements of electric supply:

- Increase the current and voltage harmonics due to resonance;
- Reducing the efficiency of the processes of generation, transmission and use of electricity as a result of additional losses;
- Speed up the aging electrical insulation;
- Erroneous operation of relay protection and automation.

Higher harmonics in motors lead to additional losses in the stator windings, rotor circles, as well as steel rotor and stator. These losses lead to an increase in the overall temperature of the machine, as well as to local overheating.

Higher harmonic components of current and voltage transformers cause an

increase in hysteresis losses and losses due to eddy currents in the steel and losses in the transformer. Also, current harmonics up electrodynamic force causing additional acoustic noise.

Harmonic current and voltage in transmission lines also lead to additional energy losses. In the case of cable harmonics affect the dielectric. This in turn increases the number of damaged cable line. In air routes harmonics on the same cause may cause an increase in losses for the crown. Electrical insulation aging can be explained by the occurrence of partial charges that apply to only a portion of the insulating gap.

Invalid operation fuses and circuit breakers is due to internal heating elements additional safeguards as a result of non-sinusoidal currents flow and action surface effect and proximity effect. Also, the higher harmonic components of current and voltage protection can disrupt or impair their performance. The nature of this violation mainly depends on the principle of the device and the operating mode of the system. In emergency mode harmonics significantly affect certain types of relay protection. If you do not reduce the level of harmonics, the probability of false relaying is greatly increased.

The actual problem is the evaluation of additional power losses in key elements of the electrical system of higher harmonics. Knowing the value of losses can be reduced them by applying arrangements, or if they are not sufficient - technical measures to reduce the level of harmonics.

The equations for determining additional losses in the elements of the electrical system of higher harmonic current and voltage in various elements of the electrical system.

The technical tools that reduce harmonics in power systems include:

- Linear inductors;
- Magnetic synthesizers;
- Passive filters;
- Hybrid filters;
- Active filters (current source and voltage source).