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CHARACTERISTIC FEATURES OF POWER SUPPLY OF THE SUBSTATIONS' AUXILIARY POWER RECEIVERS

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The composition of power receivers for auxiliary needs of substations depends on the type of substation, the power of transformers, the presence of synchronous compensators, and the type of electrical equipment. The minimum number of electrical receivers for own needs is at substations made according to simplified schemes, without synchronous compensators, without constant duty. These are blowing motors for transformers, heating of drives, cabinets of low voltage switchgear, as well as substation lighting.

The substation auxiliary receivers are divided into three groups according to the degree of responsibility. The first group is the receivers, the disconnection of which leads to the following situations: violation of the normal operating mode, partial shutdown, complete shutdown or accidents with damage to the main equipment. To power the power receivers of the first group, two sources with automatic switching on of the reserve are required. According to the Rules for the Arrangement of Electrical Installations, these electrical receivers belong to the first category in terms of power supply reliability. The second group is the receivers, the disconnection of which is permissible from 20 to 40 minutes for substations with on-duty personnel or before the arrival of the mobile team in case there is no person on duty at the substation. Restoring power to the receivers of this group is carried out manually. According to the Rules for the Arrangement of Electrical Installations[1], these electrical receivers belong to the second category in terms of power supply reliability. The third group includes receivers, the shutdown of which is permissible for a longer time. They belong to the third category in terms of power supply reliability.

According to the mode of putting into operation, electric receivers of the substation's own needs are divided into the following types: permanently switched on in the circuit, including control and relay protection circuits; switched on periodically depending on various factors, for example, depending on the outdoor temperature, on mode changes, during breaks, etc.; switched on during repairs. The permanently switched on electrical receivers of the first group include operational circuits, electric motors of the transformer cooling system, communication and telemechanics equipment, electric motors of the lubrication and cooling system, as

well as synchronous compensators. The electric receivers of the first group switched on in the repair include electric motors of fire extinguishing pumps. Periodically switched off electrical receivers of the second group are compressor motors, battery chargers, lighting, electric heating of rooms, electric heating of equipment and high voltage cabinets; the third group - ventilation and technological installations of an auxiliary building, as well as workshops. The electric receivers of the third group switched on in the repair are elevators and an oil cleaning plant.

Since the power of consumers of substations' own needs is small, they are powered by a 380/220 V network, which in turn is powered by step-down transformers. At two-transformer substations of 35-500 kV, two auxiliary transformers are installed, the power of which is selected in accordance with the load and taking into account the permissible overload when performing repair work and failure of one of the transformers. The maximum power of auxiliary transformers is 630 kVA or 1000 kVA. The connection of auxiliary transformers to the network depends on the operating current system. At all substations of 35-500 kV and above and at substations with switchgears of 110-220 kV with busbars, direct operating current is used. At 35-220 kV substations without high voltage switches, alternating or rectified current is used [2].

At substations of 110 kV and above with alternating or rectified operational current, auxiliary transformers are connected through fuses to the 6-10 kV inputs of the main transformers before their switches; at 35 kV substations - to the supply line through fuses. At substations with direct operational current, auxiliary transformers are connected through fuses or switches to the busbars of the 6-35 kV switchgear or to the winding of 6-35 kV autotransformers. Regardless of the operating current system, it is advisable to connect auxiliary transformers to an independent source, for example, to a 6-35 kV line from a neighboring substation [3,4]. Substations may have one or more 380-220 V auxiliary switchboards, depending on the layout of the equipment on the open switchgear and in the machine room. Busbars of 0.4 kV auxiliary switchboards are usually sectioned by automatic switches. Consequently, the power supply of electrical receivers of the first group is carried out according to radial schemes, and the second and third groups - through the main ones.

References

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