ELECTRIC POWER SUPPLY OF JSC ASSAKA DON MAHSULOTLARI ENTERPRISE

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Annotation. JSC “Assaka Don Mahsulotlari” has been supplied with electric energy by JSC “Andijan Regional Electric Power Supply Enterprise” since January 1, 2020, under Contract No. 140113. The total connected capacity of the enterprise is 8000 kW, with an annual consumption of 6,750,000 kWh of active energy and 2,160,000 kVArh of reactive energy. The enterprise belongs to the first tariff group and is classified as a Category II consumer in terms of power supply reliability.The main and backup power supplies are provided from the 35/6 kV “Ozod” substation through two 4000 kVA TDN-type transformers installed at the 35/6 kV “Melkombinat” substation. In addition, the enterprise operates several grain reception points supplied through separate transformer substations in compliance with the required reliability categories.

Keywords. electric power supply, transformer substation, active and reactive energy, power supply reliability, differentiated tariff, overhead transmission line, grain processing enterprise, electrical protection systems

Introduction

JSC “Assaka Don Mahsulotlari” has been receiving electric power from JSC “Andijan Regional Electric Power Supply Enterprise” since January 1, 2020, under Contract No. 140113.According to the contract, the connected capacity of the company’s electrical installations is 8000 kW. The annual contractual volume of energy consumption is 6,750,000 kWh of active energy and 2,160,000 kVArh of reactive energy. According to the contract, the company belongs to the first tariff group and is classified as a Category II consumer in terms of power supply reliability. Mutual settlements between JSC “Assaka Don Mahsulotlari” and JSC

“Andijan Regional Electric Power Supply Enterprise” are carried out based on a differentiated tariff. The main power supply source of the company is provided from the 35/6 kV “Ozod” substation via a 35 kV overhead transmission line named “OL–Tamirovtir” to the 35/6 kV “Melkombinat” substation owned by JSC “Assaka Don Mahsulotlari”, through a TDN-type transformer T-1 with a rated capacity of 4000 kVA.

The backup power supply of the company is provided from the same 35/6 kV “Ozod” substation via a 35 kV overhead transmission line named “OL–T. Namchiv” to the 35/6 kV “Melkombinat” substation, through a TDN-type transformer T-2 with a rated capacity of 4000 kVA.

On the 6 kV side, transformer T-1 is connected to the KRUN-6 kV busbar system No. 1, while transformer T-2 is connected to the KRUN-6 kV busbar system No. 2. The 35/6 kV substation of the company is equipped with 22 switchgear cells, including 2 incoming cells, 2 auxiliary service transformer (TSN) cells, 2 NGMI cells, 2 MSV and MSR cells, 1 protection cell, 6 outgoing feeder cells supplying the company’s consumers, 5 sub-consumer cells, and 2 transit cells belonging to the Assaka City Electric Power Supply Enterprise.

The company owns several grain reception facilities, and their power supply arrangements are as follows:

Boston District grain reception facility:

The power supply is provided from a nearby pole of the “Sarikh Kho‘ja” feeder of the 35/10 kV “Jalolov” substation owned by JSC “Andijan Regional Electric Power Supply Enterprise”, via a 120 m long 3×AC-35 mm² overhead line to a 400 kVA GKTP-type transformer. The facility belongs to Category III in terms of power supply reliability, and the current condition of the electrical installations complies with the requirements of this category.

Ulug‘nor District grain reception facility:

The power supply is provided from the 0.4 kV switchgear of transformer point No. 122 of the “Pillil” feeder of the 35/10 kV “Oq Oltin” substation owned by JSC

“Andijan Regional Electric Power Supply Enterprise”, via a 20 m long 3×AC-35 mm² overhead line to a 400 kVA KTP-type transformer. The facility belongs to Category II in terms of power supply reliability, and the current condition of the electrical installations complies with the requirements of this category.

Main Part

JSC “Assaka Don Mahsulotlari” is supplied with electric power from JSC “Andijan Regional Electric Power Supply Enterprise” through a 35/6 kV power supply system. The enterprise has a total connected load of 8000 kW and belongs to the first tariff group with Category II reliability requirements. Electric energy accounting is carried out based on differentiated tariffs for active and reactive power consumption.

The main power supply is provided from the 35/6 kV “Ozod” substation via a 35 kV overhead transmission line to the enterprise-owned 35/6 kV “Melkombinat” substation. Power is transmitted through a 4000 kVA TDN-type transformer (T-1). The backup power supply is ensured through an alternative 35 kV overhead line from the same substation using a second 4000 kVA TDN-type transformer (T-2), which increases the reliability of power supply. On the 6 kV side, the substation is equipped with two separate busbar systems supplied by transformers T-1 and T-2. The substation contains 22 switchgear cells, including incoming, outgoing, protection, auxiliary service, and transit cells. The outgoing feeders supply key production units such as milling workshops, feed mixing workshops, and grain reception facilities.

The transformers are protected by a comprehensive protection system. On the high-voltage side, overcurrent, gas, and overload protections are installed, while on the 6 kV side, overcurrent and earth fault protections are provided. These protections ensure safe and reliable operation of the transformers and associated switchgear. In addition, the company operates grain reception facilities in Boston and Ulug‘nor districts, which are supplied through separate transformer substations and overhead

lines. These facilities are classified as Category II and Category III consumers according to power supply reliability requirements.

Analysis and Results

The analysis shows that the power supply system of JSC “Assaka Don Mahsulotlari” is designed in accordance with reliability and operational requirements for Category II consumers. The presence of two independent 4000 kVA transformers operating on separate 6 kV busbar systems ensures continuity of power supply in case of failure of one transformer or incoming line.

The annual consumption of active and reactive energy indicates a significant industrial load, highlighting the importance of effective reactive power management to reduce losses and improve power factor. The applied protection systems provide adequate fault detection and isolation, thereby minimizing the risk of equipment damage and long-term outages.The condition of electrical installations at both the main substation and remote grain reception facilities complies with existing technical standards and reliability categories. As a result, the current power supply scheme can be considered reliable and efficient; however, further optimization of reactive power compensation and modernization of switching equipment could enhance overall energy efficiency and operational reliability.

Conclusion

Based on the conducted analysis, it can be concluded that the electric power supply system of JSC “Assaka Don Mahsulotlari” meets the operational and reliability requirements for a Category II consumer. The use of two independent 4000 kVA TDN-type transformers supplied from separate 35 kV overhead transmission lines ensures a stable and reliable power supply for the enterprise’s main production processes.

The existing protection systems on both the high-voltage and medium-voltage sides provide effective fault detection and isolation, contributing to the safe operation of transformers and switchgear equipment. The structure of the 35/6 kV

“Melkombinat” substation, with separate 6 kV busbar systems and multiple outgoing feeders, allows flexible load distribution and improves overall system reliability.

The analysis of active and reactive energy consumption shows the necessity of efficient reactive power management to reduce power losses and improve the power factor. Overall, the current power supply scheme is technically sound and operationally efficient; however, the implementation of modern switching devices and reactive power compensation measures could further enhance energy efficiency and long-term reliability.

List of used literature.

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