

ELV-15 – NEW ACCELERATOR FOR INDUSTRIAL APPLICATIONS

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Budker Institute of Nuclear Physics produces high power electron beam accelerators for industrial application. These accelerators have the name “ELV”. Flexible (because of the possibility of completing with different under beam systems) and reliable ELV accelerators found wide applications in industries. The family of the ELV accelerators covers the energy range from 0.3 to 3 MeV, and beam current up to 130 mA of beam current, with power up to 100 kW. Special versions of ELV accelerators allows to obtain 400 kW of power with a maximum beam current of 0.4A. Over 200 accelerators were delivered and installed by now. Even for the last three years, under the significant influence of COVID-19, we had delivered 17 accelerators to our customers. For 2022, the same amount is in the queue.

New accelerators of the ELV type are also being developed. Last version is “ELV-15” accelerator¹. The energy range is up to 3.0 MeV and the beam power is up to 100 kW. It is shown on Fig.1. It has all features of ELV accelerators:

- High electron beam power in wide energy range;
- High efficiency of electron beam (70-80%), which important for long term operation;
- High stability of electron beam parameters;
- Extra-long lifetime and high reliability: 24/7 mode of operation.

At present time accelerator was assembled, tested and delivered to China. Increasing the energy up to 3 MeV expands the possibilities of industrial application. It allows to increase the thickness of treated material and cable insulation. There are many requests for the new accelerator.

Additionally, it can operate as X-ray generator. The smaller conversion coefficient for 3 MeV can be compensated the higher beam power and efficiency from electricity to beam. So, it produce same amount of X-rays in comparison with 7.5 MeV accelerator and same consumption power.

During designing of new accelerator we had taken into mind the experience of previous models, changing of electrical and electronic components simultaneously with possibilities to exchange of elements and systems new and old machines.



Fig.1. Accelerating tube inside of primary windings of ELV-15 accelerator.

[1] N.K. Kuksanov, D.S. Vorobev, R.A. Salimov, S.N. Fadeev. “The High Voltage Source for the ELV-15 Accelerator”. Siberian Journal of Physics, 2022, vol. 17, no. 1, pp. 23–33.