

## **International standardization of power electronics for electrical systems based on CIGRE SC B4/IEC SC 22F cooperation**

### **Current and future technical network solutions, standardization**

**L. V. TRAVIN,**  
**Department Chief, Secretary of IEC/SC 22F**  
**Email: [lev.travin@mail.ru](mailto:lev.travin@mail.ru)**  
**12 Krasnokazarmennaya street, 111250 Moscow, Russian Federation**  
**All-Russian Electrotechnical Institute**  
**Russian Federation**

The international standardization of power electronic equipment and systems for electrical transmission and distribution systems ensures the further progressing of the technical revolution in electric power industry by the power electronics production development and the realization of current and future technical solutions caused by their application in electrical networks. The power electronics introduction into electric power systems means the thousandfold decrease of response times of control systems and operating mechanisms due to the replacement of traditional components by electronic ones. Such reduction of the response times allows to solve problems inherent to electric systems which cannot be solved (or are too expensive to solve) by traditional means - static and dynamic stability of electric power systems as well as their reliability are increased; system breakdowns are eliminated; the reliable economic and fully controlled long-distance power transmission is ensured as well as the integration of asynchronous (or operating with different frequencies) electric power systems without increasing the short-circuit current levels; a high quality of electric energy, its saving at all voltage levels, reduction of losses, a complete control of reactive power. The application of power electronics makes any electric system practically invulnerable, reliable, economic and effective.

The international standardization of power electronics for electrical systems began in 1970 when Technical Subcommittee 22F "Convertors for high-voltage direct current (HVDC) power transmission" was established in the International Electrotechnical Commission (IEC). In 1996 SC 22F scope was expanded and its title was changed to "Power electronics for electrical transmission and distribution systems". A new scope of IEC/SC 22F reads: "Standardization of electronic power conversion and/or semiconductor switching equipment and systems including the means for their control, protection, monitoring, cooling and other auxiliary systems and their application to electrical transmission and distribution systems". In 2008 IEC/TC 115 "HVDC Transmission for DC voltages above 100 kV" was established dealing with system aspects of HVDC systems and some IEC Publications produced by IEC/SC 22F but not directly connected with power electronics were passed to IEC/TC 115 for the maintenance.

The cooperation between IEC/SC 22F and CIGRE/SC 14 (now B4) began in the 70s. CIGRE Reports and Brochures produced by CIGRE/SC B4 were used by IEC/SC 22F as the scientific base for international standards and other IEC publications developed in IEC/SC 22F which in turn were the realization of scientific ideas created in CIGRE. By IEC/SC 22F request new Working Groups were established in CIGRE/SC B4 to develop the scientific base for international standards urgently needed for the further evolution of new power electronic equipment and systems for electrical systems. The report contains basic results of the liaison between CIGRE/SC B4 and IEC/SC 22F