

# Uprating and Upgrading of Existing Substations and Equipment

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## Abstract:

More and more substations throughout the world are facing various requirements that lead to the inevitable necessity of renewal of existing substation equipment without delay. There are many cases that require uprating and upgrading of substation equipment in addition to the renewal with the same technical specifications. For example, power system requirements to meet steady growth of the electricity demand and customer requirements of connecting new power generation make uprating of rated current and short-circuit current necessary. In other case, reductions of power transmission loss and system stability improvement require upgrading of voltage level. Reliability improvement requires change of substation scheme such as busbar configuration and protection, and so on.

In order to deal with above-mentioned situation, Working Group (WG) B3.23 "Guidelines for Uprating and Upgrading of Substations" was established under Advisory Area 3 of Study Committee (SC) B3: Substations of CIGRE.

In the beginning of the WG's activity, we addressed a questionnaire to CIGRE B3 members and experts who are involved in substation business all over the world. From the results of questionnaire, the current trend of increasing number of uprating and upgrading projects of substations were visualized clearly, and high expectations towards the WG activity was recognized.

CIGRE WG B3.23 commenced a full-scale activity for preparation of the technical brochure in April 2009, and has been making a great effort in order to satisfy the requirement by means of issuing a set of guidelines as a technical brochure. The scope of work covers all types of substation technologies such as air insulated substation, gas insulated substation and mixed technology switchgear. In this WG's activity, a comprehensive discussion on various types of projects including increase in electrical parameters such as rated current, short-circuit current and voltage level, improvement in functions such as bus scheme change, seismic reinforcement, specification improvement, salt/pollution contamination reinforcement, compliance with governmental new regulation, safety improvement, etc. are being carried out.

By referring to the contents of the draft technical brochure being prepared by CIGRE WG B3.23 for actual uprating and upgrading case studies in Japan, usefulness of the brochure has been proved. Points to be considered in uprating and upgrading existing substations and equipment at each stage, namely planning, engineering, basic design, detailed design, project execution, etc. are introduced here together with above-mentioned actual case studies in Japan including their background and alternative option instead of uprating and upgrading as well. As a result of trial application of the guidelines, the technical brochure is expected to contribute to providing an overall view on the issues to be considered in carrying out practical uprating and upgrading projects of substations.

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