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Pressure rise calculation due to an internal arc fault in HV metal-enclosed SF6 GIS

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High reliability of HV SF_6 switchgear makes an internal arc fault an extremely rare event. However, its occurrence cannot be completely avoided, and therefore, must be considered in the design process. Internal arc testing in SF_6 is not recommended due to its harmful environmental impact, but if necessary, tests should be performed only inside special containers, that will prevent the release of SF_6 into the atmosphere. Having in mind that tests in SF_6 and air are not yet fully comparable, accurate modeling of pressure rise due to internal arc faults is still the main means to evaluate required design parameters of SF_6 switchgear in respect of safety from internal arc faults.

A simulation tool, which calculates the pressure rise due to an internal arc inside a metal-enclosed SF_6 compartment, was developed and used in the design of a new HV GIS. The calculation procedure and obtained results are described and discussed. Validation of the tool was performed using experimental data from SF_6 internal arc tests, dating back several decades ago, when internal arc tests in SF_6 were not questionable as today.

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