Thermal overloading of MV metal enclosed switchgear

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Introduction and background:

An important step in reducing emission of greenhouses gases is to go electric. The possibility of overloading an electric device for a short time is sometimes a wanted option. The MV switchgear is one of these devices that might be overloaded for a short time. A MV switchgear is used to protect, isolate and control electrical equipment and can be found in factories, transmission systems etc. Short term overloading of a switchgear can prevent the need of renewing switchgears in substations, which both is negative for the environment and costly. By utilizing the thermal time constant of the electrical device, the possible overload time (without exceeding the temperature limits) can be analyzed by determining the temperature rise of the device.

Problem description and objective:

A challenge with many electrical devices is the temperature rise of the devices from the power loss. Too high temperatures can lead to damage or destruction of the devices. However, some electrical devices like the switchgear can be able to handle a higher current than designed for, for a short term. In this master's theses the possibilities of overloading a MV metal enclosed switchgear is analyzed.

The objectives are to develop a simplified thermal model describing the temperature rise of the system. Included in this objective is determining model parameters which is determined by preforming tests on a lab model. Next goal is to implement the thermal model and simulating the temperature rise of chosen scenarios. The scenarios are compared with the real lab measurements to analyze the model's accuracy. An overview chart of the possible overload times and currents for the system is developed based on the model.

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