TECHNICAL NOTE

Planned Services

Preventive Maintenance



Film Capacitors

Film capacitors are used in various different circuit topologies in industrial drives such as in LCL-filter, sine filter and some of the converter modules. Film capacitors are excellent fit in applications that operate high voltage and high frequency because of low ohmic losses. They are used in many applications due to their stability, low inductance and low cost. The film capacitor type is non-polarized which makes them suitable for AC signal and power use. Film capacitors can withstand over voltages up to double their rating for short periods of time, as electrolytic capacitors are more sensitive.

The lifetime of a film capacitor is dependent on the application conditions and is affected by both electrical and environmental factors. Environmental factors involve temperature, humidity, atmospheric pressure and vibrations, whereas operation voltage, ripple current and charging/discharging can be categorized as electrical factors. In frequency converter, capacitor aging involves a lack of power in high-demand dynamic changes and higher ripple in voltage.

Reasons for the maintenance actions

A film capacitor is an ageing component. The primary degradation process is a film shrinkage, which occurs during operation at high ambient temperatures and/or current load. Moisture absorption in the windings can take place in humid climate conditions. There is a risk that an aged capacitor produces flammable gasses during self-healing process. In time, those gasses can cause risk and severe danger. The capacitor is considered failed when one or more of its electrical characteristics exceeds the allowable range of specifications. Allowable tolerances are specified by the capacitor manufacturer.

Following effects are caused by capacitor aging:

- Decrease in capacitance and increase in tanδ/ESR
- Flammable gasses due to self-healing process

Preventive maintenance is an undeniably critical part of any maintenance strategy. By taking necessary maintenance actions**, failures can be prevented** before they occur. Preventive maintenance is not only **predictable**, but also cheaper, than repairing already failed drive. It's key for **avoiding unfunctional drive**, **decreases unexpected downtime, reduces costly repairs**, **improves reliability**, **enhances drive life expectancy**, **increases safety** and reduces risk of injury. If preventive maintenance action are not carried out, it can result in **total breakdown of the drive**.

ABB recommends changing wearing components to avoid risk of failures in frequency converter. Check maintenance schedule for recommended maintenance intervals and component replacements for a specific drive.

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