

## **Service life evaluation of PVC insulated low voltage electrical cables by thermographic inspection**

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The maintenance function must manage assets over their entire life cycle. Thereat preventive maintenance has been replaced by predictive maintenance, characterized by actions based on the operational status of the equipment, rather than periodic replacements of parts. For PVC insulated low voltage electrical cables, physical asset analyzed in this paper, non-invasive and non-destructive tests that estimate the degradation or the useful life are not found in the literature.

In this context, this work developed an empirical method that evaluates useful life of low voltage electrical cables insulated to PVC, based on thermographic inspection, a stablished and non-invasive technique.

PVC insulated flexible electrical cables; black, blue, red, yellow and white colors usually used in living conductors of electrical installations; were thermally degraded thermally through controlled and accelerated way. Throughout the aging, samples of the cables insulation had their degradation characterized by reference tests, thermogravimetric analysis (TGA) and aging index (step voltage test). The same samples were submitted to thermographic inspection to measure emissivity by the contact thermometer method.

Results demonstrated that the emissivity of the insulation surface of the cables presents the same variation characteristic of other tests established in technical standards along its thermal degradation, with the advantage of being measurable in a non-invasive and non-destructive manner and with no need to sample material.

The proposed method has high potential for use within the asset management philosophy, allowing operation of the electrical installation during its entire life, minimizing unnecessary preventive replacements of electrical cables and also reducing untimely operational interruptions due to end of life failures.

### **Keywords**

Life cycle, predictive maintenance, PVC, cable, inspection method, degradation