TECHNICAL APPLICATION NOTE **TS 03-017I Issue 0**

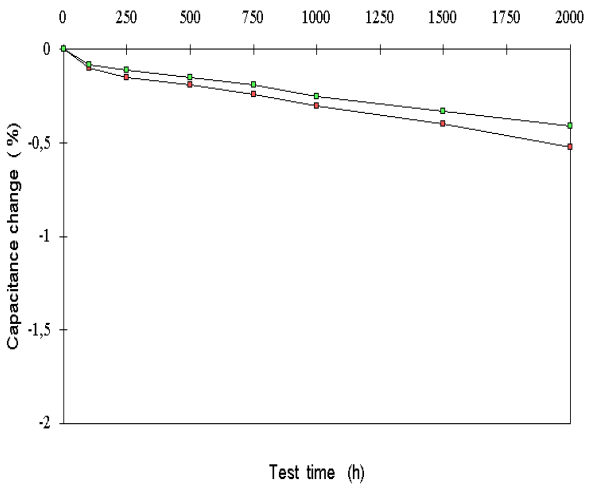
Life of power capacitors

Customers ask very often which is the approximated expected life of power capacitors.

Life of a power capacitor is a parameter which is measured in tens of years and that shall be calculated through trials and indirect tests.

For the valuation of the effective life in capacitors it is successfully used a law of potential type, as the one indicated in equation 1, which extrapolates the results obtained in an accelerating ageing test.

A law of this type is used between other cases in the **IEC 1049** Standard to determine the expected life of capacitors for power factor correction in lighting equipments.



$$L = L_{Test} \left(\frac{U_{Test}}{U_N}\right)^k \qquad (1)$$

where:

L	=	Expected life of the capacitor
L_{Test}	=	Duration of ageing test
U_{Test}	=	Voltage applied during ageing test
U_N	=	Rated voltage of the capacitor
k	=	Coefficient which depends on the technology of the capacitor

For capacitors of metallized polypropylene it is usually used a value of k . 9.

A test of accelerating ageing consist in submitting the capacitor during a long working period at a higher voltage than the one in service, while at the same time it is under the maximum working temperature. **IEC 831** Standard establishes, for instance, that low voltage power capacitors have to succeed a 1500 hours duration test with a voltage 25% higher than the rated one, without appearing any short-circuit and with a diminution of capacitance (or power) lower than 5%.

In the figure it is shown the typical ageing test result of a group of **LIFASA** power capacitors with rated voltage 400 V, tested at 500 V. If as failure criteria it is taken a decrease of capacity of 5%, through the graphic can be deducted that the mean life of a power capacitor is of about 160.000 hours, which is approximately equivalent to 18 years of **continuous service**. If the capacitor does not work 24 hours a day, then of course, its duration will be bigger.

As reliability of a power capacitor depends in great measure on the installation and working conditions, above results suppose that capacitor works within its rated parameters of voltage, temperature and current. In relation to this point it is necessary to emphasize the importance of respecting the working condition indicated in the Installation Instructions (ICP) which are joining capacitors and that are based in the "Guide for installation and operation of power capacitors" of the **IEC 831** Standard.