Capacitor case temperature regulations

How does temperature affect the life of a capacitor?
Every 10° C increase in internal temperature halves the component lifetime. The structure and materials used in the capacitor make heat dissipation more difficult. To operate properly,the case must be electrically isolated from the core where heat is generated. The voltage breakdown of the insulation materials is often in excess of 350 volts DC.

Why is capacitor temperature so high in industrial environments?
Capacitor temperature is surprisingly high in industrial environments when we consider elevated enclosure temperatures as well as self-heating due to ripple current. The rule of 10 is a simplistic model for determining the longevity of electronics. Each 10°C increase in temperature reduces the life by a factor of 2.

What determines a high-temperature limit of an electrolytic capacitor?
Largely the formation voltagesets the high-temperature limit. Higher formation voltages permit higher operating temperatures but reduce the capacitance. The low-temperature limit of an electrolytic capacitor is set largely by the cold resistivity of the electrolyte.

What temperature should a capacitor be stored?
For long periods of storage keep capacitors at cool room temperatures and in an atmosphere free of halogen gases like chlorine and fluorine that can corrode aluminum. Storage temperature ranges are from -55 ºCto the upper limit of the operating-temperature ranges. Sources: Capacitor Selection Guide - KEMET (.PDF)

What factors should be considered when choosing a capacitor?
Also it is recommended to consider the temperature distribution in equipment and seasonal temperature variable factor. When the capacitor is used at a temperature above the upper category temperature, insulation resistance of the capacitor may deteriorate and cause rapid current increase and a short circuit.

Do capacitors have a maximum temperature rating?
They and most capacitors DO have a maximum temperature rating. Most are rated to 85 C but for SMPS and other power devices you may need to buy 105 C rated versions. An 85 C capacitor exposed to 100 C will have a short life. It may dry up and do nothing,or pressure build-up may make it go BANG.

In order to scale a capacitor correctly for a particular application, the permisible ambient tempera-ture has to be determined. This can be taken from the diagram "Permissible ambient ...

Ceramic Capacitors (Safety Regulation SMD) SS L A B W E H Dimensions in mm (not to scale) Type BC, FC Specifi cations Characteristics Temp. Char. SL/GP Temp. Char. B/Y5P, E/Y5U, ...

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Higher formation voltages permit higher operating temperatures but reduce the capacitance. The low-temperature limit of an electrolytic capacitor is set largely by the cold resistivity of the electrolyte. The higher cold resistivity increases the capacitor"s ESR 10 to 100 fold and reduces the available capacitance.

Up to 28A ripple current, continuous load, is possible to specify, at a capacitor case temperature of 125oC (?20x 43mm- case). To achieve this performance the capacitor body needs to be heat- sinked. As a comparison, the ripple current for some of the best capacitors on the market today is 14-15 A (heat- sinked, 125oC, same case-size).

Any operating temperature should not exceed the upper category temperature. It is necessary to select a capacitor whose rated temperature is higher than the operating temperature. Also it is ...

Capacitors should be stored at room temperature, low humidity and out of direct sunlight. Storage at elevated temperature and/or high relative humidity may have a negative influence on taping ...

When capacitor companies develop products, they choose materials with characteristics that will enable the capacitors to operate within the specified variation (3rd character) over the specified temperature range (1st and 2nd character). The X7R capacitors that I was using should not vary more than ±15% over a temperature range of -55°C to +125°C. OK, so either I had a bad ...

?max = 70°C or 80°C depending on the capacitors model ?max temperature of the hottest point on the case at which the capacitor may operate ?min minimum operating ambient temperature at which the capacitor may operate Storage temperature ?smin =-40°C, ?smax =+85°C ?smax maximum ambient temperature at which the capacitor

Capacitor temperature is surprisingly high in industrial environments when we consider elevated enclosure temperatures as well as self-heating due to ripple current. The rule of 10 is a simplistic model for determining the longevity of electronics. Each 10°C increase in temperature reduces the life by a factor of 2. More sophisticated models ...

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electrolytic capacitor relates directly to its internal temperature. Every 10° C increase in internal temperature halves the component lifetime. The structure and materials used in the capacitor make heat dissipation more difficult. To operate properly, the case must be electrically isolated from the core where heat is generated. The voltage ...

Differences in normal DC leakage current among capacitors can cause voltage imbalances. The use of voltage divider shunt resistors with consideration to leakage currents can prevent capacitor voltage imbalances. NOTE : Please do not use in the series in the case of conductive polymer hybrid aluminum electrolytic capacitor.

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Case dimensions d x l mm ESRmax 100 Hz 20 °C m ESRmax 100 Hz -40 °C m ESRmax 10 kHz 20 °C m IAC,R 10 kHz TA 125 °C A IAC,max1) 2) 10 kHz TC 125 °C A 1) Maximum ripple current at 125 °C capacitor case temperature TC (measurement at aluminum case surface), when mounted to a heat sink. Further details available upon request. V

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