

## *Norms tightening up in the frequency range from 2 KHz to 150KHz*

The trends of European standardization institutions like VDE and CENELEC are mainly going into the direction of limiting the disturbance radiation in the frequency range of 2kHz – 150 kHz. For electronically counter, smart meter and scales CENELEC is already valid.

Bajog electronic informed already beginning 2012 of this fact. In terms of our future energy supply it is essential that smart grid can be used reliable. This is not possible with the actual disturbance voltage and  $dU/dt$  strain. For that reason there will be further regulations.

Bajog electronic is the only manufacturer that advises of this grid problem since 1996 and focuses on the frequency range from 1 kHz to 150 kHz.

Standard parts like X2 and Y2 condensers or ferrite materials have not been qualified to resist the network load of partial 1010KV/ $\mu$ s.

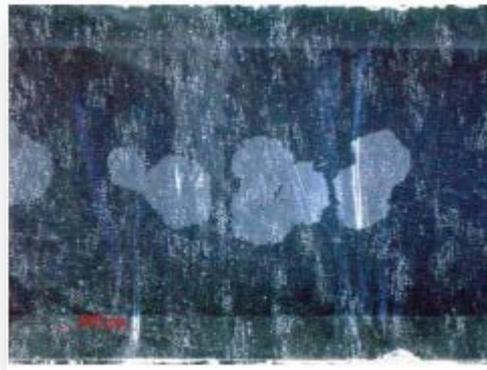
Condensers have been destroyed by these energy spikes already after a short period of usage. Ferrite materials already went into saturation after a few mill amperes in the asymmetric sector. Additionally the metallization of standard condensers vanished after short time of usage by corrosion.

Cabin filters and special filters of Bajog electronic in the low and middle voltage range (up to 30.000 Volt) which for example are used for NATO-command-centers, testing sites and safe rooms, have to work at least 20 years without loss of functionality.

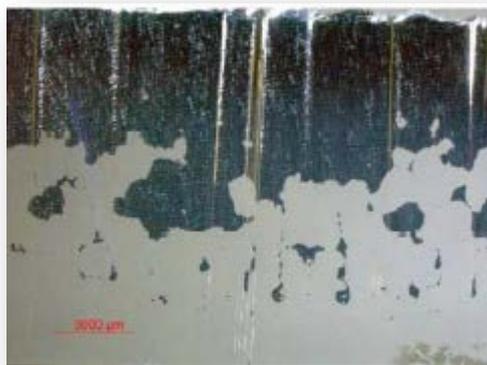
For this reason Bajog electronic studied and constructed their own parts very successful since 1996.

The last years there have been massive quality problems with applications for which X2-foil-condensers have been used in a serial array to supply voltage (for example in capacitive energy supplies or in PLC-modules of smart meter). It has been determined that X2-condensers partially loose most of their capacity after only 2-3 years. As cause of defect a corrosion of the foil metallization (electrode) because of wetness has been stated. Please watch the photos for that.

This problem has never been caught in parallel filter applications of X2-condensers, because there a malfunction of the X2-condensers does not always have an influence on the functionality of the end product. But, the original EMC-characteristics of the end product worsen enormous. As you can see in all datasheets of condenser-manufacturers, in the actual IEC-norm for radio shielding condensers there is no specification for wetness persistence. That means that all available standard X2 and Y2 foil condensers will have this duration-of-live-problem also in the future.



**1: Destruction of foil by  $dU/dt$  influences.**



**2: Lost if metallization by wetness**

Meanwhile EMC-filters are equipped directly on the conductor panel. This increases wetness and dU/dt related errors massively.

If you are interested in the topics “attenuation in the lower frequency range, condenser problems by dU/dt pressure and wetness, appropriate filter solutions”, then we enjoy offering you a consultation.

The suitable EMC-filter (external and on-board), should achieve the following criteria for electric and electronic applications:

- There must not be a difference between attenuation rate at 50 Ohm and without pressure. Attenuation must be the same.
- No saturation even at higher asymmetric load current (which always occur at IGBT)
- No saturation at overload
- Successful dU/dt limitation in the lower frequency range to keep disturbance values <150kHz within the limit (related to VDE 0871) and do not affect the range above 150 kHz anymore.  
Minimal dimensions at maximal attenuation.
- Suppression of harmonics.
- Lowest possible power loss.
- No decrease of functionality for more than 20 years, even under worst case situations (high dU/dt, high air humidity)

→ Most of the filter and condenser specifications have no indication on duration of life, but mostly only include a MTBF-information.

Manufacturer of conductor boards (equipped with X2 and Y2 condensers) do not give any expectations on life duration either.

Using regular foil or radio shielding condensers this is actually not possible anyway.

- The energy of bursts and transients –being detected up to 10kV in the grid nowadays – have to be converted to heat within the filter and therefore be eliminated and kept away from electronic components/circuits
- Clear load throw-off of grid-bound transients, therefore increased lifetime of overload protection parts (like e.g. varistors).
- In the following years an intensification of the norms in the lower frequency range is to be expected. For EMC this has already now to be considered.

Because of the continuous increasing of electrification (e.g. renewable energies, LED, smart meter, smart home, electronic controlled pumps and engines) it is sure that EMC-disturbances will get more in the future. Because of that an effective EMC-filtering (related to emission) is very important for industrial devices with a usage of over 20 years (e.g. elevators, smart meter, PLC-applications for smart grid)

Our economic advantage in Germany is our knowledge, our way of thinking, our creativity, our inquiring mind and especially our worldwide known quality. We must not give up those attributes.

More information you will find on our website via the following Link.

<http://www.bajog.de/de/fachberichte/cenelec-neue-vorschrift.html>