

To help clarify on your IEC questions.

Urms

There is no "rms" rating in the IEC61071. Urms is a number ASC uses to prevent confusion between the IEC61071 and IEC60831 Un ratings.

- Under IEC60831 Un is defined as "*the r.m.s. value of the alternating voltage for which the capacitor has been designed*"
- Under IEC61071 Un is defined as "*maximum operating peak recurrent voltage of either polarity of a reversing type waveform for which the capacitor has been designed*"

They use a lot of words in their definitions but "alternating voltage" and "reversing type waveform" can be more simply stated as AC voltage.

Because IEC61071 is designed for waveforms that can be very different from typical sinusoidal AC voltages (reference the diagrams in Annex A) it is very difficult to predict what the actual rms voltage will be; it will most likely be different for every application. Therefore it makes sense to define Un (the rated voltage) as the peak AC voltage that the capacitor will be operated at. However, if you were to apply a sinusoidal waveform to capacitors designed under this spec, the rms voltage would be equal to the peak AC voltage Un divided by the square root of 2. Therefore $Un = Urms * 1.414$ (square root of 2) for sinusoidal waveforms. When we state "Urms" on capacitors rated under the IEC61071 spec, we are stating what the rated sinusoidal rms voltage is.

This comes in handy when comparing how the parts are tested under each IEC spec. The T-T voltage tests for each spec are listed below.

- IEC60831 Section 9.1 Routine Test:
 - $Ut = 2.15 * Un$ (remember Un under 60831 is the rated rms voltage)
 - It states that the test is "*a substantially sinusoidal voltage at a frequency between 15 Hz and 100 Hz*".
- IEC61071 Section 5.5 Voltage test between terminals:
 - This spec does not actually use "Ut" but states "AC test voltage r.m.s value" instead.
 - $Ut = 1.5 * Un$ (remember that Un under 61071 is the rated peak voltage)
 - It states that the "*test voltage may be at a frequency of 50 Hz or 60 Hz*".
- In order to satisfy both of these requirements our tester has been designed to test with a sinusoidal voltage at 60 Hz.

Because Un means something different for each IEC spec (rms voltage in one and peak voltage in the other) it is easier to compare the tests in terms of a sinusoidal rms rating as below.

- IEC60831
 - $Urms = Un$ (Un = rated rms voltage)
 - $Ut = 2.15 * Urms$
- IEC61071
 - $Un = Urms * 1.414$ (Un = rated peak voltage)
 - $Ut = 1.5 * 1.414 * Urms$
 - $Ut = 2.12 * Urms$

Therefore you can see that the AC test voltage for both specs is almost the same.

Usurge

IEC61071 states Us as "*peak voltage induced by a switching or any other disturbance of the system which is allowed for a limited number of times and for durations shorter than the basic period*". Again, they use a lot of words but they are really describing the rated "surge voltage" which is why we state Usurge instead of Us. Unfortunately they do not provide any equations stating a direct relationship between Us and Un, however they do state "*Maximum permissible voltages*" in Section 6.1 Table 5. The highest overvoltage (surge voltage) listed in that table is "*1.5 * Un for 30ms permitted 1000 times during the life of the capacitor*". Because this meets their Us definition and is the highest terminal to terminal voltage that the specification allows for, we use this number for Usurge. Therefore, $Usurge = 1.5 * Un$