



# DID YOU KNOW?

## BIASED HUMIDITY TEST WITH SAFETY CAPACITORS

We all want our electronics to function properly. In addition to vehicles, outdoor equipment such as energy meters and solar inverters face harsh environmental conditions that can result in field failures. To ensure that electronic components will perform reliably in these conditions, many environmental tests are performed. Amongst them, biased humidity tests have increased in importance.

The most severe humidity test is the so-called biased 85 / 85 or temperature humidity bias (THB) test. It is an accelerated life test in which the capacitors are exposed to moisture at high temperature and rated voltage. The automobile industry first introduced this test with an extremely demanding duration of 1,000 hours in its AEC-Q200 standard. The extreme parameter values were chosen to simulate long term environmental influences – this can span decades – within a short period of time.

### 85 / 85 Test Conditions in the AEC-Q200:

T	Temperature	85 °C ± 2 °C
H	Humidity	85 % ± 5 % relative humidity
B	Bias	@ rated voltage
	Duration	1,000 hours

The international industrial standard IEC 60384-14.4 (Fixed Capacitors for Electromagnetic Interference Suppression and Connection to the Supply Mains) defines requirements and test conditions for safety capacitors. The new Annex I allows for classification of components in terms of moisture resistance.

	Class I	Class II	Class III
<b>Denomination</b>	Resistance at moisture conditions	Resistance at increased moisture conditions	Increased resistance at increased moisture conditions
<b>Test condition A</b>	40 °C / 93 % RH / 21 d	40 °C / 93 % RH / 56 d	60 °C / 93 % RH / 56 d
<b>Test condition B</b>	85 °C / 85 % RH / 168 h	85 °C / 85 % RH / 500 h	85 °C / 85 % RH / 1,000 h
<b>Remark</b>	@ rated voltage Test condition B is a substitutional accelerated test for test condition A		

The table above shows that the conditions of the THB test defined in AEC-Q200 are equivalent to those of Class IIIB of the IEC 60384-14.4 standard.

Even under harsh conditions in outdoor applications, Y1 and Y2 safety capacitors must not fail, because this might lead to life-threatening events like electrical shocks. Therefore, it is important to know the 85 / 85 performance of those capacitors.

Vishay's VY1...C (X1 / Y1) and AY2 series (X1 / Y2) meet the highest class of moisture resistance, the biased 85 / 85 1,000 hour test. The VY1...C is the industry first X1 / Y1 safety capacitor to meet the challenging Class IIIB specifications of IEC 60384-14.4. The AY2 is specified according to AEC-Q200.