

OSM/IN DECISION

Standard:	EN 60730-1:2011	Sub clause:	24.1, H.11.2.5, Table H.21,	Sheet N°:	OSM/IN 258A
Subject:	Tests required for capacitors	Key words:	- capacitor - overvoltage category	Meeting N° Inquiry	25 (2015) OSM_IN(Inq)-135_2015

Question:

Table H.27.1 defines what to test on specific components.

In case of capacitors, the definition is not appropriate. For example for Capacitors Y2 or X3, it is necessary to adjust the table to the overvoltage category and nominal voltage.

Proposal:

Only capacitors certified according their relevant standard IEC 60384-14, IEC 60384-16, IEC 60384-17 and used according their nominal characteristics (e.g. overvoltage category, nominal voltage) are not subjected to short circuit conditions.

Explanatory Notes:

In clause 24.2.1 it is explained that when a component is certified according to its safety standard and correctly implemented, only safety issues are tested which are not covered within the previous tests.

Therefore, if a certified Y1 capacitor or two Y2 capacitors are applied across reinforced insulation, no short circuit tests (as required in H27.1) are necessary.

Table 1 and 2 of IEC 60384-14:2013

Table 1 – Classification of Class X capacitors

Subclass	Peak impulse voltage in service	Application	Peak impulse voltage U_P applied before endurance test
X1	>2,5 kV ≤4,0 kV	High pulse application	When $C_N \leq 1,0 \mu\text{F}$ $U_P = 4 \text{ kV}$ When $C_N > 1,0 \mu\text{F}$ $U_P = \frac{4}{\sqrt{\frac{C_N}{10^{-6} \text{ F}}}}$ in kV
X2	≤2,5 kV	General purpose	When $C_N \leq 1,0 \mu\text{F}$ $U_P = 2,5 \text{ kV}$ When $C_N > 1,0 \mu\text{F}$ $U_P = \frac{2,5}{\sqrt{\frac{C_N}{10^{-6} \text{ F}}}}$ in kV

X1 capacitors may be substituted by Y2 or Y1 capacitors of the same or higher U_R . X2 capacitors can be substituted with X1 or Y2 or Y1 capacitors of the same or higher U_R .

NOTE 1 The factor used for the reduction of U_P for capacitance values above $1,0 \mu\text{F}$ maintains $0,5 \times C_N U_P^2$ constant for these capacitance values; C_N is in F.

NOTE 2 Overvoltage categories in association with rated impulse voltage and rated mains voltage are found in IEC 60664-1.

Table 2 – Classification of Class Y capacitors

Subclass	Type of insulation bridged	Range of rated voltages	Peak impulse voltage U_P applied before endurance test
Y1	Double insulation or reinforced insulation	≤500 V	$U_P = 8,0 \text{ kV}$
Y2	Basic insulation or supplementary insulation	≥150 V ≤500 V	When $C_N \leq 1,0 \mu\text{F}$ $U_P = 5 \text{ kV}$ When $C_N > 1,0 \mu\text{F}$ $U_P = \frac{5}{\sqrt{\frac{C_N}{10^{-6} \text{ F}}}}$ kV
Y4	Basic insulation or supplementary insulation	<150 V	$U_P = 2,5 \text{ kV}$

Y2 capacitors may be substituted by Y1 capacitors of the same or higher U_R .

NOTE 1 For definitions of basic, supplementary, double and reinforced insulation, see IEC 61140.

NOTE 2 The factor used for the reduction of U_P for capacitance values above $1,0 \mu\text{F}$ maintains $0,5 \times C_N U_P^2$ constant for these capacitance values; C_N is in F.

NOTE 3 Overvoltage categories in association with rated impulse voltage and rated mains voltage are found in IEC 60664-1.