

OSM/IN DECISION

Standard: EN 60730-1:2000 + A12:2003 + A1:2004 + A13:2004 + A14:2005 + A15:2007 + A16:2007 + A2:2008	Sub clause: Table H.27.1	Sheet N°: OSM/IN 258
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Subject: Application of Table H.27.1 in case of approved capacitors	Key words: - Capacitor; - Overvoltage category	Meeting N°: 20 (2010) Item: 3.4.3
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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, it is necessary to adjust the table to the overvoltage category and nominal voltage.

Table H.27.1 – Electrical/electronic component fault modes table

Component type	Short ¹⁴⁾	Open ¹⁾	Remarks
Capacitors			
X1 and Y types according to IEC 60384-14		X	
Metallized film according to IEC 60384-16 and IEC 60384-17		X	
All other types	X	X	

X1 are approved to 4kV are defined in IEC60384-14 for category III,
X2 are defined for category II
Y1 are approved for 250V and overvoltage pulse 8kV,
Y2 are approved for 250V and overvoltage pulse 5kV
Y3 have no defined overvoltage
Y4 are approved for rated voltage 150V and 2.5kV

X1 is approved for cat III and in H27 only the fault mode open must be applied.

X2 in a cat III appliance shall be tested fault mode short and open.

For a appliance cat II an X2 the fault mode open may be sufficient, but short mode is required according to table H.27.1.

Y3 or Y4 should not be accepted without a fault mode short tested but fault mode short is not required according to table H.27.1.

How to apply approved capacitors?

Decision: Table H.27.1, 3rd box (capacitors) requirements, shall be completed with IA of IEC 60384-14. We apply for the time being Tables 1C and 1D from EN 60950-1:2006 (see attachments)

Explanatory notes: Certified capacitors according their relevant standard and used according their nominal characteristics are not subjected to short circuit conditions.

To be continued

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Table 1C – Capacitor ratings according to IEC 60384-14

Capacitor subclass according to IEC 60384-14	RATED VOLTAGE of the capacitor V r.m.s.	TYPE TEST voltage of the capacitor kV peak
Y1	Up to and including 500	8
Y2	Over 150 up to and including 300	5
Y4	Up to and including 150	2,5
X1	–	4 ^(a)
X2	–	2,5 ^(a)

Rules for the application of Table 1C

- 1 Capacitors used to bridge BASIC INSULATION, SUPPLEMENTARY INSULATION or REINFORCED INSULATION shall be class Y except that it is permitted to bridge BASIC INSULATION in a SECONDARY CIRCUIT by a class X capacitor.
- 2 The voltage rating of the capacitor shall be at least equal to the rms working voltage across the insulation being bridged, determined according to 2.10.2.2.
- 3 For a single capacitor bridging functional insulation, basic insulation or supplementary insulation, the peak test voltage of the capacitor shall be at least equal to the required withstand voltage.
- 4 For a single capacitor bridging double insulation or reinforced insulation, the peak test voltage of the capacitor shall be at least equal to twice the REQUIRED WITHSTAND VOLTAGE.
- 5 It is permitted to use a higher grade capacitor than the one specified, as follows:
 - subclass Y1 if subclass Y2 is specified;
 - subclass Y1 or Y2 if subclass Y4 is specified;
 - subclass Y1 or Y2 if subclass X1 is specified;
 - subclass X1, Y1 or Y2 if subclass X2 is specified.
- 6 It is permitted to use two or more capacitors in series in place of the single capacitor specified, as follows:
 - subclass Y1 or Y2 if subclass Y1 is specified;
 - subclass Y2 or Y4 if subclass Y2 is specified;
 - subclass X1 or X2 if subclass X1 is specified.
- 7 If two or more capacitors are used in series, they shall
 - all have the same nominal capacitance value;
 - each be rated for the total rms working voltage across the insulation; and
 - comply with the other rules above.

(a) For capacitance values of more than 1 µF, this test voltage is reduced by a factor equal to \sqrt{C} , where C is the capacitance value in µF.

Table 1D gives a number of informative examples of the application of capacitors selected in accordance with Table 1C. Other examples are possible.

To be continued

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Table 1D – Informative examples of application of capacitors

AC MAINS SUPPLY VOLTAGE up to and including V r.m.s.	Overvoltage Category	MAINS TRANSIENT VOLTAGE kV	Bridged insulation	Capacitor type	Number of capacitors
150	II	1,5	B or S	Y4	1
	II	1,5	D or R	Y2	1
	II	1,5	D or R	Y4	2
	III	2,5	F	X2	1
	III	2,5	B or S	Y4	1
	III	2,5	D or R	Y1	1
	IV	4,0	F	X1	1
	IV	4,0	B or S	Y2	1
250	IV	4,0	D or R	Y1	1
	II	2,5	F	X2	1
300	II	2,5	B or S	Y2	1
	II	2,5	D or R	Y1	1
	II	2,5	D or R	Y2	2
250	III	4,0	F	X1	1
300	III	4,0	D or R	Y1	1
	III	4,0	D or R	Y2	2
	IV	6,0	B or S	Y1	1
	IV	6,0	D or R	Y1	2
500	II	4,0	B or S	Y1	1
	II	4,0	D or R	Y1	1
	III	6,0	B or S	Y1	1
	III	6,0	D or R	Y1	2
	IV	8,0	B or S	Y1	1
	IV	8,0	D or R	Y1	2

The values in the table apply to FUNCTIONAL INSULATION (F), BASIC INSULATION (B), SUPPLEMENTARY INSULATION (S), DOUBLE INSULATION (D) and REINFORCED INSULATION (R).