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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Composite station post insulators for substations with AC voltages greater than 1 000 V up to 245 kV –
Part 1: Dimensional, mechanical and electrical characteristics

Supports isolants composites destinés aux postes à courant alternatif de tensions supérieures à 1 000 V jusqu'à 245 kV –
Partie 1: Caractéristiques dimensionnelles, mécaniques et électriques

IEC 62231-1:2015-10(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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COMPOSITE STATION POST INSULATORS FOR SUBSTATIONS WITH AC VOLTAGES GREATER THAN 1 000 V UP TO 245 kV –

Part 1: Dimensional, mechanical and electrical characteristics

FOREWORD

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International Standard IEC 62231-1 has been prepared by IEC technical committee 36: Insulators.

The text of this standard is based on the following documents:

FDIS	Report on voting
36/372/FDIS	36/373/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 62231 series, published under the general title *Composite station post insulators for substations with a.c. voltages greater than 1 000 V up to 245 kV*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

COMPOSITE STATION POST INSULATORS FOR SUBSTATIONS WITH AC VOLTAGES GREATER THAN 1 000 V UP TO 245 kV –

Part 1: Dimensional, mechanical and electrical characteristics

1 Scope

This part of IEC 62231 is applicable to composite station post insulators for substations with a.c. voltages greater than 1 000 V up to 245 kV.

It also applies to composite station post insulators of similar design used in power stations of railway systems.

This part of IEC 62231 specifies main dimensions and values for mechanical and electrical characteristics of composite station post insulators.

NOTE The composite station post insulators covered by this standard are primarily intended for outdoor service, but can also be used indoor.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60815-1:2008, *Selection and dimensioning of high-voltage insulators intended for use in polluted conditions – Part 1: Definitions, information and general principles*

IEC 60815-3, *Selection and dimensioning of high-voltage insulators intended for use in polluted conditions – Part 3: Polymer insulators for a.c. systems*

IEC 62231:2006, *Composite station post insulators for substations with a.c. voltages greater than 1 000 V up to 245 kV – Definitions, test methods and acceptance criteria*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
composite station post insulator
post insulator consisting of a solid load bearing cylindrical insulating core, a housing and end fittings attached to the insulating core

[SOURCE: IEC 62231:2006, 3.1]

3.2
creepage distance
shortest distance or the sum of the shortest distances along the surface on an insulator between two conductive parts which normally have the operating voltage between them

Note 1 to entry: The surface of cement or of any other non-insulating jointing material is not considered as forming part of the creepage distance.

Note 2 to entry: If a high resistance coating is applied to parts of the insulating part of an insulator, such parts are considered to be effective insulating surfaces and the distance over them is included in the creepage distance.

[SOURCE: IEC 60050-471:2007, 471-01-04]

3.3
end fitting
integral component or formed part of an insulator, intended to connect it to a supporting structure, or to a conductor, or to an item of equipment, or to another insulator

Note 1 to entry: Where the end fitting is metallic, the term “metal fitting” is normally used.

[SOURCE: IEC 60050-471:2007, 471-01-06]

3.4
maximum design cantilever load
MDCL
cantilever load level above which damage to the insulator begins to occur and that should not be exceeded in service

[SOURCE: IEC 62231:2006, 3.18]

3.5
specified cantilever load
SCL
cantilever load which can be withstood by the insulator when tested under the prescribed conditions

[SOURCE: IEC 62231:2006, 3.17]

3.6
specified compression load
SCoL
compression load which can be withstood by the insulator when tested under the prescribed conditions

[SOURCE: IEC 62231:2006, 3.25]

3.7
specified tension load
STL
tension load which can be withstood by the insulator when tested under the prescribed conditions

[SOURCE: IEC 62231:2006, 3.21]

3.8
specified torsion load
SToL
torsion load level which can be withstood by the insulator when tested under the prescribed conditions

[SOURCE: IEC 62231:2006, 3.19]

3.9
unified specific creepage distance
USCD
creepage distance of an insulator divided by the maximum operating voltage across the insulator (for a.c. systems usually the highest voltage for equipment $U_m/\sqrt{3}$) which is generally expressed in mm/kV and specified as a minimum value

Note 1 to entry: This definition differs from that of Specific Creepage Distance where the phase-to-phase value of the highest voltage for the equipment is used. For phase-to-earth insulation, this definition will result in a value that is $\sqrt{3}$ times that given by the definition of Specific Creepage Distance in IEC 60815:1986.

[SOURCE: IEC 60815-1:2008, 3.1.6, modified definition and Note 1 to entry]

4 Mechanical and dimensional characteristics

Composite station post insulators are characterized by the following mechanical and dimensional characteristics, values of which are specified in Tables 1 and 2:

- maximum design cantilever load (MDCL)
- specified cantilever load (SCL),
- specified compression load (SCoL),
- specified tension load (STL),
- specified torsion load (SToL),
- insulator height,
- minimum creepage distance,
- maximum diameter of insulating part,
- metal fitting (end fitting) arrangement (see Clause 9).

Tables 1a and 1b give a minimum creepage distance for each insulator along with the highest voltage for equipment based on a unified specific creepage distance (USCD) of 34,7 mm/kV or 43,3 mm/kV (phase-to-earth). This voltage is given for information only. These USCD are regarded as a representative value of the medium (c) and heavy (d) pollution classes as defined in IEC 60815-1. Table 2 gives similar information for insulators based on North American practice, with a USCD of 27,8 mm/kV corresponding to the light pollution class (b). Creepage distances different to those given in the Tables can also be considered for the insulators intended for use in various polluted conditions. Further information on USCD and selection of the insulators for polluted conditions can be found in IEC 60815-1 and 60815-3.

5 Electrical characteristics

Composite station post insulators are characterized by the following electrical characteristics, values of which are specified in Tables 1 and 2.

- dry lightning impulse withstand voltage,
- wet power frequency withstand voltage.

6 Designation

Composite station post insulators are designated in Tables 1a, 1b and 2 as follows:

- by the letters CSP or NCSP followed by a number indicating the dry lightning impulse withstand voltage in kilovolts;
- then followed by the letter A or B, representing the pitch circle diameter of top and bottom metal fittings (A:76mm, B:127mm);

- and then followed by two numbers separated by a dash, which indicate the maximum design cantilever load (MDCL) in kilo Newtons with two digits and the minimum creepage distance in millimetres.
- For example, designation NCSP1050B-06-5030 stands for the composite station post insulator with a dry lightning impulse withstand voltage of 1 050 kV, a pitch circle diameter of 127 mm, a maximum design cantilever load of 0,6 kN and a minimum creepage distance of 5 030 mm.

NOTE Each designation of composite station post insulators means:

CSP: Composite station post insulator

NCSP: Composite station post insulator for North America practice

7 Marking

The composite station post insulator shall be marked in accordance with IEC 62231.

8 Tolerances

The dimensions of creepage distance and maximum diameter of insulating part given in Tables 1 and 2 are the absolute minima and maxima, respectively; hence no tolerances are applicable. The tolerances of the insulator heights are given in Tables 1 and 2. Tolerances of parallelism, eccentricity, and angular deviation shall be in accordance with IEC 62231.

The dimensions and tolerances of insulators supplied in compliance with this standard shall be shown on the manufacturer's drawing.

9 Metal fitting arrangements

The metal fitting arrangements shall be in accordance with Tables 1 and 2. Fixing holes shall be equally spaced on the appropriate pitch circle, which shall be concentric with the axis of the insulator. Holes in top and bottom fittings shall be in line, unless otherwise specified, and they shall be so arranged as to permit the use of normal hexagon bolted heads and nuts.

Table 1a – Designation and characteristics of composite station post insulators (ref IEC 60273 Table IV) for IEC 60815-1 class c

Designation	Dry lightning impulse withstand voltage	Wet power frequency withstand voltage	Insulator height	Minimum creepage distance	Maximum diameter of insulating part	Maximum design cantilever load	Specified torsion load	Specified compression load	Specified tension load	Metal fitting pitch circle diameter		Highest voltage for equipment based on 34,7 mm/ kV USCD
	kV	kV	mm	mm	mm	kN	Nm	kN	kN	mm		kV
				IEC 60815-1 Class c						Top	Bottom	
CSP60A-40-240	60	20	190±5	240	220	4,0	1 200	45	70	76	76	12
CSP75A-40-240	75	28	215±5	240	220	4,0	1 200	45	70	76	76	12
CSP95A-50-240	95	38	255±5	240	220	5,0	1 200	45	70	76	76	12
CSP125A-50-480	125	50	305±5	480	220	5,0	1 200	45	70	76	76	24
CSP150A-50-720	150	50	355±5	720	220	5,0	1 200	45	70	76	76	36
CSP170A-40-720	170	70	445±5	720	220	4,0	1 200	45	70	76	76	36
CSP170B-50-720	170	70	445±5	720	240	5,0	3 000	45	80	127	127	36
CSP200A-40-720	200	70	475±5	720	220	4,0	1 200	45	70	76	76	36
CSP200B-50-720	200	70	475±5	720	240	5,0	3 000	45	80	127	127	36
CSP250B-40-1040	250	95	560±5	1 040	220	4,0	1 200	45	70	127	127	52
CSP250B-50-1040	250	95	560±5	1 040	240	5,0	3 000	45	80	127	127	52
CSP325B-24-1450	325	140	770±5	1 450	220	2,4	1 200	30	70	127	127	72.5
CSP325B-32-1450	325	140	770±5	1 450	240	3,2	3 000	110	80	127	127	72.5
CSP450B-32-2460	450	185	1020±5	2 460	240	3,2	3 000	60	80	127	127	123
CSP450B-64-2460	450	185	1020±5	2 460	255	6,4	4 000	100	110	127	127	123
CSP450B-32-2900	450	185	1020±5	2 900	240	3,2	3 000	60	80	127	127	145
CSP450B-32-2900	450	185	1020±5	2 900	255	3,2	4 000	100	110	127	127	145
CSP550B-16-2460	550	230	1 220±5	2 460	240	1,6	3 000	50	80	127	127	123
CSP550B-50-2460	550	230	1 220±5	2 460	255	5,0	4 000	90	110	127	127	123
CSP550B-16-2900	550	230	1 220±5	2 900	240	1,6	3 000	50	80	127	127	145
CSP550B-50-2900	550	230	1 220±5	2 900	255	5,0	4 000	90	110	127	127	145
CSP550B-16-3400	550	230	1 220±5	3 400	240	1,6	3 000	50	80	127	127	170
CSP550B-50-3400	550	230	1 220±5	3 400	255	5,0	4 000	90	110	127	127	170

Designation	Dry lightning impulse withstand voltage	Wet power frequency withstand voltage	Insulator height	Minimum creepage distance	Maximum diameter of insulating part	Maximum design cantilever load	Specified torsion load	Specified compression load	Specified tension load	Metal fitting pitch circle diameter		Highest voltage for equipment based on 34,7 mm/ kV USCD
	kV	kV	mm	mm	mm	kN	Nm	kN	kN	mm		kV
				IEC 60815-1 Class c						Top	Bottom	
CSP650B-08-2900	650	275	1 500±5	2 900	240	0,8	3 000	25	80	127	127	145
CSP650B-50-2900	650	275	1 500±5	2 900	255	5,0	4 000	50	110	127	127	145
CSP650B-80-2900	650	275	1 500±5	2 900	290	8,0	6 000	110	110	127	127	145
CSP650B-08-3400	650	275	1 500±5	3 400	240	0,8	3 000	25	80	127	127	170
CSP650B-50-3400	650	275	1 500±5	3 400	255	5,0	4 000	50	110	127	127	170
CSP650B-80-3400	650	275	1 500±5	3 400	290	8,0	6 000	110	110	127	127	170
CSP750B-08-3400	750	325	1 700±5	3 400	240	0,8	3 000	22	80	127	127	170
CSP750B-40-3400	750	325	1 700±5	3 400	255	4,0	4 000	45	110	127	127	170
CSP750B-50-3400	750	325	1 700±5	3 400	290	5,0	6 000	80	110	127	127	170
CSP750B-08-4900	750	325	1 700±5	4 900	240	0,8	3 000	22	80	127	127	245
CSP750B-40-4900	750	325	1 700±5	4 900	255	4,0	4 000	45	110	127	127	245
CSP750B-80-4900	750	325	1 700±5	4 900	290	8,0	6 000	80	110	127	127	245
CSP850B-08-4900	850	360	1 900±5	4 900	240	0,8	3 000	20	80	127	127	245
CSP850B-32-4900	850	360	1 900±5	4 900	255	3,2	4 000	40	110	127	127	245
CSP850B-80-4900	850	360	1 900±5	4 900	290	8,0	6 000	70	110	127	127	245
CSP950B-16-4900	950	360	2 100±5	4 900	290	1,6	6 000	80	110	127	127	245

NOTE 1 Specific requirements on acceptable deflection of composite station post insulators on the actual application shall be discussed between users and suppliers.

NOTE 2 For applications where the deflection of the post under load is critical, refer to the manufacturer's load deflection curve to ensure suitability. In some cases an insulator of higher strength rating may be selected to provide adequate rigidity.

NOTE 3 For applications where two different types of force may be applied to the insulator simultaneously, e.g. a compressive and a cantilever load, the manufacturer's combined load curve may be consulted to ensure suitability.