



**SLOVENSKI STANDARD**  
**oSIST prEN IEC 60383-1:2022**  
**01-junij-2022**

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**Izolatorji za nadzemne vode za nazivne napetosti nad 1 kV - 1. del: Keramični ali stekleni izolatorji za izmenične sisteme - Definicije, preskusne metode in prevzemna merila**

Insulators for overhead lines with a nominal voltage above 1000 V - Part 1: Ceramic or glass insulator units for a.c. systems - Definitions, test methods and acceptance criteria

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PREVIEW**

Isolateurs pour lignes aériennes de tension nominale supérieure à 1000 V - Partie 1: Éléments d'isolateurs en matière céramique ou en verre pour systèmes à courant alternatif - Définitions, méthodes d'essai et critères d'acceptation

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**Ta slovenski standard je istoveten z: prEN IEC 60383-1:2022**

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SECRETARIAT: Sweden	SECRETARY: Mr Dan Windmar
OF INTEREST TO THE FOLLOWING COMMITTEES: TC 11	PROPOSED HORIZONTAL STANDARD: <input type="checkbox"/> Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
FUNCTIONS CONCERNED: <input type="checkbox"/> EMC <input type="checkbox"/> ENVIRONMENT <input checked="" type="checkbox"/> QUALITY ASSURANCE <input type="checkbox"/> SAFETY	
<input checked="" type="checkbox"/> SUBMITTED FOR CENELEC PARALLEL VOTING <b>Attention IEC-CENELEC parallel voting</b> The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting. The CENELEC members are invited to vote through the CENELEC online voting system.	<input type="checkbox"/> NOT SUBMITTED FOR CENELEC PARALLEL VOTING

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TITLE:

**Insulators for overhead lines with a nominal voltage above 1000 V - Part 1: Ceramic or glass insulator units for a.c. systems - Definitions, test methods and acceptance criteria**

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## CONTENTS

1		
2		
3	FOREWORD.....	6
4	INTRODUCTION.....	8
5	1 Scope.....	9
6	2 Normative references .....	9
7	3 Terms and definitions .....	10
8	4 Classification, types of insulators and insulating materials .....	13
9	4.1 Insulator classes .....	13
10	4.2 Insulator types .....	13
11	4.3 Insulating materials .....	13
12	5 Identification of insulators .....	13
13	6 Classification of tests.....	14
14	6.1 Type tests .....	14
15	6.2 Sample tests .....	14
16	6.3 Routine tests.....	14
17	7 Cross-reference tables for tests to be performed .....	14
18	7.1 Pin insulators .....	14
19	7.2 Line post insulators .....	17
20	7.3 String insulator units .....	19
21	7.3.1 Prescribed type tests on string insulator units .....	19
22	7.4 Insulators for overhead electric traction lines .....	24
23	8 Procedures for type and sample tests .....	24
24	8.1 Insulator selection for type tests .....	24
25	8.2 Sampling rules and procedures for sample tests .....	24
26	8.3 Re-test procedure for sample tests .....	25
27	9 General requirements for electrical tests .....	25
28	10 Artificial rain parameters for wet tests .....	26
29	11 Mounting arrangements for electrical tests .....	26
30	12 Dry lightning impulse voltage tests .....	26
31	12.1 Test procedure.....	26
32	12.2 Acceptance criteria .....	26
33	13 Wet power frequency withstand voltage tests .....	26
34	13.1 Test procedure.....	26
35	13.2 Acceptance criteria .....	27
36	14 RIV test.....	27
37	14.1 Test procedure.....	27
38	14.2 Acceptance criteria .....	27
39	15 Puncture withstand test .....	28
40	15.1 Impulse puncture testing in air.....	28
41	15.2 Power frequency puncture withstand test.....	28
42	16 Routine electrical test .....	28
43	17 Verification of the dimensions .....	29
44	18 Electromechanical failing load test .....	29
45	18.1 Test procedure.....	29

46	18.2	Acceptance criteria .....	30
47	19	Mechanical failing load test .....	30
48	19.1	Test procedure for pin and line post insulators .....	30
49	19.2	Test procedure for string insulator units .....	30
50	19.3	Acceptance criteria for pin insulators .....	30
51	19.4	Acceptance criteria for string insulator units and line post insulators .....	31
52	20	Thermal-mechanical performance test .....	31
53	20.1	Test procedure .....	31
54	20.2	Acceptance criteria .....	32
55	21	Residual strength test .....	32
56	21.1	Previous tests .....	32
57	21.2	Preparation of the test pieces .....	32
58	21.3	Test procedure .....	32
59	21.4	Test results .....	33
60	21.5	Acceptance criteria .....	33
61	22	Verification of the axial, radial and angular displacements .....	33
62	22.1	Test procedure .....	33
63	22.2	Acceptance criteria .....	34
64	23	Verification of the locking system .....	34
65	23.1	Conformity of the locking device .....	34
66	23.2	Verification of locking .....	35
67	23.3	Position of the locking device .....	35
68	23.4	Procedure for the operation test .....	35
69	23.5	Acceptance criteria for the operation test .....	35
70	24	Temperature cycle test .....	36
71	24.1	Test procedure for ceramic or toughened glass material .....	36
72	24.2	Test procedure for of annealed glass .....	36
73	24.3	Special test procedure for insulators with thick sections or very large insulators .....	36
74			
75	24.4	Complementary specifications .....	37
76	24.5	Acceptance criteria .....	37
77	25	Thermal shock test .....	37
78	25.1	Sample test .....	37
79	25.1.1	Test procedure .....	37
80	25.1.2	Acceptance criteria .....	37
81	25.2	Routine thermal shock test .....	37
82	25.2.1	Test procedure .....	37
83	25.2.2	Acceptance criteria .....	37
84	26	Porosity test .....	37
85	26.1	Test procedure .....	37
86	26.2	Acceptance criteria .....	38
87	27	Galvanizing test .....	38
88	27.1	Test procedure .....	38
89	27.1.1	Appearance .....	38
90	27.1.2	Determination of the coating mass by the magnetic test method .....	38
91	27.2	Acceptance criteria .....	38
92	27.2.1	Acceptance criteria for the appearance test .....	38
93	27.2.2	Acceptance criteria for the value of coating mass .....	38

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94	28	Zinc sleeve test (if applicable).....	39
95	28.1	General requirements concerning the zinc sleeve .....	39
96	28.2	Type test procedure .....	39
97	28.3	Sample test procedure .....	39
98	29	Routine visual inspection .....	40
99	29.1	Insulators with ceramic insulating parts.....	40
100	29.2	Insulators with glass insulating parts .....	40
101	30	Impact test .....	41
102	30.1	Test procedure.....	41
103	30.2	Acceptance criteria .....	41
104	31	Routine mechanical test.....	41
105	31.1	Routine mechanical test on line post insulators.....	41
106	31.2	Routine mechanical test on string insulator units.....	42
107	32	Mounting arrangements for tests on pin insulators.....	42
108	32.1	Standard mounting arrangement for electrical tests.....	42
109	32.2	Mounting arrangements for electrical tests reproducing service conditions.....	43
110	32.3	Mounting arrangement for the mechanical failing load test .....	43
111	33	Coefficients for statistical analysis of the test results on line post Insulators.....	43
112	33.1	Coefficient for type tests.....	43
113	33.2	Coefficients for sample tests .....	43
114	34	Mounting arrangements for tests on line post insulators.....	43
115	34.1	Standard mounting arrangement for electrical tests .....	43
116	34.2	Mounting arrangements for electrical tests reproducing service conditions.....	44
117	34.3	Mounting arrangement for the mechanical failing load test .....	44
118	35	Coefficients for statistical analysis of the test results on string insulator units.....	44
119	35.1	Coefficient for type tests.....	44
120	35.2	Coefficients for sample tests .....	44
121	36	Mounting arrangements for electrical tests on string insulator units.....	45
122	37	Mounting arrangements for electrical tests on Insulators for overhead electric traction lines.....	45
123			
124	37.1	Standard mounting arrangement.....	45
125	37.2	Mounting arrangement representing service conditions .....	46
126	Annex A (informative)	Method of comparison of the results of electromechanical or mechanical type and sample tests .....	49
127			
128	Annex B (informative)	Illustration of the mechanical and electromechanical test acceptance procedure for string insulator units and line post insulators .....	51
129			
130	B.1	Flow charts .....	51
131	B.2	Calculated examples of acceptance and rejection .....	53
132	Annex C (informative)	Coatings on ceramic or glass insulators .....	56
133	C.1	General.....	56
134	C.2	Material fingerprinting and ageing performance.....	56
135	C.3	Type testing .....	56
136	C.4	Sample testing .....	57
137	C.5	Routine testing.....	57
138	C.6	Pollution performance .....	57
139	C.7	Acceptance criteria .....	57
140	Annex D (informative)	Impact test .....	58

142	Figure 1 – Schematic representation of the thermal-mechanical performance test .....	47
143	Figure 2 – Measurement of axial and radial displacements .....	47
144	Figure 3 – Measurement of angular displacement .....	48
145	Figure 4 – Greatest thickness of the insulator .....	48
146	Figure B.1 – Acceptance flow chart for mechanical or electromechanical type tests .....	51
147	Figure B.2 – Acceptance flow chart for mechanical or electromechanical sample tests .....	52
148	Figure B.3 – Flow chart of the comparison of type and sample tests .....	53
149	Figure C.1 – Recommended thickness criteria based on current experience .....	57
150	Figure C.2 – Adherence test criteria .....	57
151	Figure D.1 – Example of equipment for impact testing .....	58
152		
153	Table 1 – Cross-reference table for pin insulators .....	16
154	Table 2 – Cross-reference table for line post insulators .....	18
155	Table 3 – Cross-reference table for string insulator units – cap and pin .....	21
156	Table 4 – Cross-reference table for string insulator units – long rod .....	23
157	Table 5 – Sample sizes for sample tests .....	25
158	Table 6 – Acceptance criteria for impact test .....	41
159	Table 7 – Coefficients for sample tests (line post insulators) .....	43
160	Table 8 – Coefficients for sample tests (string insulator units) .....	45
161	Table A.1 – Values for constants a, b and c .....	49
162	Table A.2 – Values for constants a, b and c (re-test) .....	50
163	Table B.1 – Examples for mechanical and electromechanical sample tests .....	54
164	Table B.2 – Blank form for calculation for mechanical and electromechanical sample	
165	tests .....	55
166		
167		

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INSULATORS FOR OVERHEAD LINES WITH A NOMINAL VOLTAGE  
ABOVE 1 000 V –****Part 1: Ceramic or glass insulator units for a.c. systems - Definitions, test  
methods and acceptance criteria**

## FOREWORD

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International Standard IEC 60383 has been prepared by technical committee 36:MT20.

This 5<sup>th</sup> edition cancels and replaces the 4<sup>th</sup> edition published in 1993. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) The complete document has been revised and updated. The layout of the document has been changed in order to increase the readability.
- b) RIV test has been added (clause 14)
- c) Impulse puncture test in air has been added (clause 15.1)
- d) Residual strength test has been added (clause 21)



- 222 e) Zinc sleeve test has been added (clause 28)  
223 f) Impact test has been added (clause 30)  
224 g) Annex C, coatings on ceramic and glass insulators has been added  
225 h) Annex D, impact test has been added

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

FDIS	Report on voting
XX/XX/FDIS	XX/XX/RVD

227  
228 Full information on the voting for the approval of this standard can be found in the report on  
229 voting indicated in the above table.

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

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

- 234 • reconfirmed,
- 235 • withdrawn,
- 236 • replaced by a revised edition, or
- 237 • amended.

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240

## INTRODUCTION

241 This standard deals with four different types of insulators:

- 242 • Pin insulators
- 243 • Line post insulators
- 244 • String insulator units
- 245 • Insulators for overhead electric traction lines

246 The user of this part need only refer to the clause dealing with the type of insulator to be tested  
247 and to the general requirements and relevant test.

248

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# INSULATORS FOR OVERHEAD LINES WITH A NOMINAL VOLTAGE ABOVE 1 000 V –

## Part 1: Ceramic or glass insulator units for a.c. systems - Definitions, test methods and acceptance criteria

### 1 Scope

This part of IEC 60383 applies to insulators of ceramic material or glass for use on a.c. overhead power lines and overhead traction lines with a nominal voltage greater than 1 000 V and a frequency not greater than 100 Hz. It also applies to insulators for use on d.c. overhead electric traction lines.

This part applies to string insulator units, rigid overhead line insulators and to insulators of similar design when used in substations.

It does not apply to insulators forming parts of electrical apparatus or to parts used in their construction or to post insulators which are covered by IEC 60168: Tests on indoor and outdoor post insulators of ceramic material or glass for systems with nominal voltages greater than 1 000 V.

Tests on insulator strings and insulator sets (for example, wet switching impulse voltage) are dealt with in part 2 of IEC 60383.

The object of this part is:

- to define the terms used
- to define insulator characteristics and to prescribe the conditions under which the specified values of these characteristics shall be verified
- to prescribe test methods
- to prescribe acceptance criteria.

This part does not include requirements dealing with the choice of insulators for specific operating conditions.

Specific requirements on the use of coatings on ceramic or glass insulators are described in the informative Annex C.

NOTE A guide for the choice of insulators under polluted conditions has been published, see IEC 60815-1 and -2.

Numerical values for insulator characteristics are specified in IEC 60305, IEC 60433 and IEC 60720.

### 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 60050-471: International Electrotechnical Vocabulary (IEV) - Insulators

IEC 60060-1: High-voltage test techniques - Part 1: General definitions and test requirements

IEC 60120: Dimensions of ball and socket couplings of string insulator units

IEC 60305: Insulators for overhead lines with a nominal voltage above 1000 V - Ceramic or glass insulator units for a.c. systems - Characteristics of insulator units of the cap and pin type

IEC 60372: Locking devices for ball and socket couplings of string insulation units: Dimensions and tests

293 IEC 60433: Insulators for overhead lines with a nominal voltage above 1 000 V - Ceramic  
294 insulators for a.c. systems - Characteristics of insulator units of the long rod type

295 IEC 60437: Radio interference test on high-voltage insulators

296 IEC 60471: Dimensions of clevis and tongue couplings of string insulator units

297 IEC 60720: Characteristics of line post insulators

298 IEC TR 60797: Residual strength of string insulator units of glass or ceramic material for  
299 overhead lines after mechanical damage of the dielectric

300 IEC 61211: Insulators of ceramic material or glass for overhead lines with a nominal voltage  
301 greater than 1 000 V - Impulse puncture testing in air

302 ISO 1459: Metallic coatings - Protection against corrosion by hot dip galvanizing - Guiding  
303 principles

304 ISO 1460: Metallic coatings - Hot dip galvanized coatings on ferrous metals - Determination of  
305 the mass per unit area - Gravimetric method

306 ISO 1461: Metallic coatings - Hot dip galvanized coatings on fabricated ferrous products -  
307 Requirements

308 ISO 1463: Metal and oxide coatings - Measurement of coating thickness - Microscopical method

309 ISO 2064: Metallic and other non-organic coatings - Definitions and conventions concerning the  
310 measurement of thickness

311 ISO 2178: Non-magnetic coatings on magnetic substrates - Measurement of coating thickness  
312 - Magnetic method

### 313 **3 Terms and definitions**

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

#### 315 **3.1**

#### 316 **insulator string**

317 one or more string insulator units coupled together and intended to give flexible support to  
318 conductors and stressed mainly in tension

#### 319 **3.2**

#### 320 **rigid insulator**

321 insulator intended to give rigid support to an overhead line conductor and to be stressed mainly  
322 by bending and compressive loads

#### 323 **3.3**

#### 324 **long rod insulator**

325 rigid insulator intended to be subjected to tensile loads, comprising an insulating part having  
326 an approximately circular cylindrical shank, with or without sheds, and external or internal fixing  
327 devices attached to each end

#### 328 **3.4**

#### 329 **cap and pin insulator**

330 insulator comprising an insulating part usually having the form of a disk or bell, with or without  
331 ribs on its surface, and end fittings consisting of an outside cap and an inside pin attached  
332 axially

#### 333 **3.5**

#### 334 **pin insulator**

335 rigid insulator consisting of an insulating component intended to be mounted rigidly on a  
336 supporting structure by means of a pin passing up inside the insulating component which  
337 consists of one or more pieces of insulating material permanently connected together

338 Note 1 to entry: The pin can have two basic shapes. With one shape, the insulating component is fixed to the end  
339 of the pin and does not allow contact of the insulating component with the supporting structure. With the other shape,  
340 the insulating component is fixed by means of the pin in contact with the supporting structure either directly or with  
341 a plate in between, the plate being either a separate washer or part of the pin (sometimes referred to as a pin post  
342 insulator).

### 343 **3.6**

#### 344 **line post insulator**

345 rigid insulator intended to be subjected to cantilever, tensile and compressive loads,  
346 constructed with one or more insulating materials and assembled on a metal base that is  
347 intended to be mounted rigidly on a supporting structure

### 348 **3.7**

#### 349 **traction insulator**

350 an insulator or insulator set intended to give flexible or rigid support for overhead electric  
351 traction lines. All types of overhead line insulators may be used for this purpose.

### 352 **3.8**

#### 353 **annealed glass**

354 glass which has been treated to eliminate internal stresses

### 355 **3.9**

#### 356 **toughened glass**

glass in which pre-stresses have been created in order to improve its mechanical characteristics

### 357 **3.10**

#### 358 **lot**

359 a group of insulators offered for acceptance from the same manufacturer, of the same design  
360 and manufactured under presumed similar conditions of production. One or more lots may be  
361 offered together for acceptance; the lot(s) offered may consist of the whole, or part, of the  
362 quantity ordered.

### 363 **3.11**

#### 364 **flashover (of an insulator)**

365 disruptive discharge external to the insulator, and over its surface, connecting those parts which  
366 normally have the operating voltage between them

### 367 **3.12**

#### 368 **impulse withstand voltage**

369 highest peak value of impulse voltage of prescribed form and polarity which does not cause  
370 breakdown of insulation under specified conditions

### 371 **3.13**

#### 372 **power frequency withstand voltage**

373 rms value of sinusoidal power frequency voltage that the insulation of the given equipment can  
374 withstand during tests made under specified conditions and for a specified duration

### 375 **3.14**

#### 376 **electromechanical failing load**

377 maximum load reached when a string insulator unit is tested under the prescribed conditions of  
378 the test

### 379 **3.15**

#### 380 **mechanical failing load**

381 maximum load reached when an insulator is tested under the prescribed conditions of test

### 382 **3.16**

#### 383 **specified mechanical failing load, SFL**

384 mechanical load that causes the loss of mechanical characteristics of any part of an insulator,  
385 when tested according to the relevant standard

386 Note 1 to entry: SFL can also be used for specified electromechanical failing load.

387 **3.17**  
388 **puncture (of an insulator)**  
389 disruptive discharge passing through the solid insulating material of the insulator which  
390 produces a permanent loss of dielectric strength

391 **3.18**  
392 **creepage distance**  
393 shortest distance or the sum of the shortest distances along the surface on an insulator between  
394 two conductive parts which normally have the operating voltage between them

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

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

399 Note 3 to entry: Insulators with grooves e.g. pin insulators, the creepage measurements shall start at the centre of  
400 the side groove

401 **3.19**  
402 **minimum creepage distance**  
403 is the defined minimum allowed creepage distance which cannot be subject to a specified negative  
404 tolerance.

405 **3.20**  
406 **nominal creepage distance**  
407 is the value of the creepage distance which can also be subject to a specified positive or  
408 negative tolerance.

409 **3.21**  
410 **minimum nominal creepage distance**  
411 is the defined minimum allowed creepage distance which can also be subject to a specified  
412 negative tolerance.

413 Note 1 to entry: Minimum nominal creepage distance is a definition that normally applies to cap and pin insulators

414 **3.22**  
415 **displacements**  
416 **axial displacement**  
417 maximum positional variation, parallel to the insulator axis, of a definite point on the  
418 circumference of the considered insulator during one complete revolution around the insulator  
419 axis.

420 **radial displacement**  
421 maximum positional variation, perpendicular to the insulator axis, of a definite point on the  
422 circumference of the considered insulator during one complete revolution around the insulator  
423 axis.

424 **angular displacement**  
425 angular deviation around the insulator axis between corresponding planes of the two coupling  
426 pieces.

427 **3.23**  
428 **short standard string**  
429 is used to verify characteristics of a unit which are significant only to an insulator string

430 For cap and pin units:

431 an insulator string of 5 insulator units.

432 For long rod insulator units:

433 an insulator string between 1 m and 2 m in length for long rod insulator units intended to be  
434 assembled in a string. For long rod insulators less than 1 m long intended to be used as a  
435 string, the unit itself is considered as a short standard string.

436 Note 1 to entry – The definition short standard string is different to the definition of short string in IEC 61467

437 Note 2 to entry - For systems with insulator string with less than 5 insulators, must be considered the string with the  
438 real number of insulators

### 439 **3.24**

#### 440 **specified characteristics**

441 A specified characteristic is:

442 -either the numeric value of a voltage or of a mechanical load or any other characteristic  
443 specified in an IEC international standard;

444 -or the numeric value of any such characteristic agreed between the purchaser and the  
445 manufacturer.

## 446 **4 Classification, types of insulators and insulating materials**

### 447 **4.1 Insulator classes**

448 Insulators for overhead lines are divided into two classes according to their design:

449 Class A: an insulator or insulator unit in which the length of the shortest puncture path through  
450 solid insulating material is at least equal to half the arcing distance. An example of a class A  
451 insulator is a long rod insulator with external fittings.

452 Class B: an insulator or insulator unit in which the length of the shortest puncture path through  
453 solid insulating material is less than half the arcing distance. An example of a class B insulator  
454 is a cap and pin insulator.

### 455 **4.2 Insulator types**

456 For the purposes of this part of IEC 60383, overhead line insulators are divided into the four  
457 following types:

- 458 – pin insulators
- 459 – line post insulators
- 460 – string insulator units, divided into two sub-types:
  - 461 – cap and pin insulators
  - 462 – long rod insulators
- 463 – insulators for overhead electric traction lines.

464 NOTE - Insulators for overhead traction lines are normally insulators of one of the first three types above, with or  
465 without special adaptations of the metal fittings, designed for use on overhead electric traction lines.

### 466 **4.3 Insulating materials**

467 The insulating materials of overhead line insulators covered by this part are:

- 468 – ceramic material, porcelain
- 469 – annealed glass, being glass in which the mechanical stresses have been relaxed by thermal  
470 treatment
- 471 – toughened glass, being glass in which controlled mechanical stresses have been induced  
472 by thermal treatment.

473 NOTE 1 Further information on the definition and classification of ceramic and glass insulating materials can be  
474 found in IEC 60672-1 and IEC 60672-3.

475 NOTE 2 The term "ceramic material" is used in this part to refer to porcelain materials and, contrary to North American  
476 practice, does not include glass.

## 477 **5 Identification of insulators**

478 Each insulator shall be marked, either on the insulating component or on a metal part, with the  
479 name or trademark of the manufacturer and the year of manufacture. In addition, each string  
480 insulator unit shall be marked with the specified electromechanical or mechanical failing load  
481 whichever is applicable. These markings shall be legible and indelible.

482 The designations included in IEC 60305, IEC 60433 and IEC 60720 may be used.