



**SLOVENSKI STANDARD**  
**oSIST prEN IEC 62391-1:2022**  
**01-januar-2022**

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**Nespremenljivi električni dvoplastni kondenzatorji za električno in elektronsko opremo - 1. del: Rodovna specifikacija**

Fixed electric double-layer capacitors for use in electric and electronic equipment - Part 1: Generic specification

Elektrische Doppelschichtkondensatoren zur Verwendung in elektrischen und elektronischen Geräten - Teil 1: Fachgrundspezifikation

Condensateurs électriques fixes à double couche utilisé dans les équipements électriques et électroniques - Partie 1: Spécification générique

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SECRETARIAT: Netherlands	SECRETARY: Mr Ronald Drenthen
OF INTEREST TO THE FOLLOWING COMMITTEES:	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 type="checkbox"/> QUALITY ASSURANCE <input type="checkbox"/> SAFETY	
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TITLE:

**Fixed electric double-layer capacitors for use in electric and electronic equipment - Part 1: Generic specification**

PROPOSED STABILITY DATE: 2030

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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**FIXED ELECTRIC DOUBLE-LAYER CAPACITORS  
FOR USE IN ELECTRIC AND ELECTRONIC EQUIPMENT –**

230

**Part 1: Generic specification**

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**FOREWORD**

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268

International Standard IEC 62391-1 has been prepared by IEC technical committee 40: Capacitors and resistors for electronic equipment.

269

The text of this International Standard is based on the following documents:

FDIS	Report on voting
40/XX/FDIS	40/XX/RVD

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

273

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

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

- 277 • reconfirmed,
- 278 • withdrawn,
- 279 • replaced by a revised edition, or
- 280 • amended.

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# FIXED ELECTRIC DOUBLE-LAYER CAPACITORS FOR USE IN ELECTRIC AND ELECTRONIC EQUIPMENT –

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## Part 1: Generic specification

292

### 1 Scope

293 This part of IEC 62391 applies to fixed electric double-layer capacitors (hereafter referred to  
294 as capacitor(s)) mainly used in DC circuits of electric and electronic equipment.

295 This part of IEC 62391 establishes standard terms, inspection procedures and methods of test  
296 for use in sectional and detail specifications of electronic components for quality assessment  
297 or any other purpose.

298

### 2 Normative references

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

303 IEC 60062, *Marking codes for resistors and capacitors*

304 IEC 60063, *Preferred number series for resistors and capacitors*

305 IEC 60068-1:2013, *Environmental testing – Part 1: General and guidance*

306 IEC 60068-2-1, *Environmental testing – Part 2-1: Tests – Tests A: Cold*

307 IEC 60068-2-2, *Environmental testing – Part 2-2: Tests – Tests B: Dry Heat*

308 IEC 60068-2-6, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

309 IEC 60068-2-14, *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*

310 IEC 60068-2-20, *Environmental testing – Part 2-20: Tests – Test Ta and Tb: Test methods  
311 for solderability and resistance to soldering heat of devices of with leads*

312 IEC 60068-2-21, *Environmental testing – Part 2-21: Tests – Test U: Robustness of  
313 terminations and integral mounting devices*

314 IEC 60068-2-45:1980, *Environmental testing – Part 2-45: Tests – Test XA and guidance:  
315 Immersion in cleaning solvents*

316 IEC 60068-2-45:1980/Amendment 1:1993)

317 IEC 60068-2-58, *Environmental testing – Part 2-58: Tests – Test Td: Test methods for  
318 solderability, resistance to dissolution of metallization and to soldering heat of surface  
319 mounting devices (SMD)*

320 IEC 60068-2-69, *Environmental testing – Part 2-69: Tests – Test Te/ Tc: Solderability testing  
321 of electronic components and printed boards by the wetting balance (force measurement)  
322 method*

323 IEC 60068-2-78, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady*  
324 *state*

325 IEC 60294, *Measurement of the dimensions of a cylindrical component with axial*  
326 *terminations*

327 IEC 60695-11-5, *Fire hazard testing – Part 11-5: Test flames – Needle-flame test method –*  
328 *Apparatus, confirmatory test arrangement and guidance*

329 IEC 60717, *Method for the determination of the space required by capacitors and resistors*  
330 *with unidirectional terminations*

331 IEC 61193-2, *Quality assessment systems – Part 2: Selection and use of sampling plans for*  
332 *inspection of electronic components and packages*

### 333 **3 Terms and definitions**

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

335 ISO and IEC maintain terminological databases for use in standardization at the following  
336 addresses:

- 337 • IEC Electropedia: available at <http://www.electropedia.org/>
- 338 • ISO Online browsing platform: available at <http://www.iso.org/obp>

#### 339 **3.1** 340 **type**

341 group of components having similar design features and manufacturing techniques, enabling  
342 them to be considered together, either for qualification approval or for quality conformance  
343 inspection

344 Note 1 to entry: In some cases, components described in several detail specifications may be considered as  
345 belonging to the same type.

346 [SOURCE: IEC 60384-1:202X, 3.39 – modified, the remark on "single detail specification"  
347 was deleted from the definition and the Note was rephrased.]

#### 348 **3.2** 349 **style**

350 subdivision of a type, generally based on dimensional factors

351 Note 1 to entry: A style may include several variants, generally of a mechanical order.

#### 352 **3.3** 353 **class**

354 classification of the capacitor by the capacitance value and the internal resistance value  
355 depending upon the application

#### 356 **3.4** 357 **family**

358 <electronic components> group of components which predominantly displays a particular  
359 physical attribute and/or fulfils a defined function

#### 360 **3.5** 361 **subfamily**

362 <electronic components> group of components within a family manufactured by similar  
363 technological methods

364 **3.6**  
365 **DC capacitor**  
366 capacitor designed essentially for application with direct voltage

367 Note 1 to entry: A DC capacitor may not be suitable for use on AC supplies.

368 **3.7**  
369 **nominal capacitance**  
370  $C_N$   
371 designated capacitance value usually indicated on the capacitor

372 **3.8**  
373 **category temperature range**  
374 range of ambient temperatures for which the capacitor has been designed to operate  
375 continuously

376 Note 1 to entry: This is given by the lower and upper category temperature.

377 **3.9**  
378 **lower category temperature**  
379 minimum ambient temperature for which a capacitor has been designed to operate  
380 continuously

381 **3.10**  
382 **upper category temperature**  
383 highest ambient temperature including internal heating in which a capacitor is designed to  
384 operate continuously

385 [SOURCE: IEC 61881-3:2012, 3.17, modified – The note to entry has been deleted.]

386 **3.11**  
387 **rated temperature**  
388 maximum ambient temperature at which the rated voltage may be continuously applied

389 **3.12**  
390 **rated voltage**  
391  $U_R$   
392 maximum DC voltage or peak value of pulse voltage which may be applied continuously or  
393 repetitively to a capacitor at any temperature between the lower category temperature and the  
394 rated temperature

395 **3.13**  
396 **category voltage**  
397  $U_C$   
398 maximum voltage which may be applied continuously to a capacitor at its upper category  
399 temperature

400 **3.14**  
401 **temperature derated voltage**  
402 maximum voltage that may be applied continuously to a capacitor when it is at any  
403 temperature between the rated temperature and the upper category temperature

404 Note 1 to entry: Information on the voltage/temperature dependence at temperatures between the rated  
405 temperature and the upper category temperature is given in the detail specification.

406 **3.15**  
407 **surge voltage ratio**  
408 quotient of the maximum instantaneous voltage which may be applied to the terminations of  
409 the capacitor for a specified time at any temperature within the category temperature range  
410 and the rated voltage or the temperature derated voltage, as appropriate

411 Note 1 to entry: The number of times per hour that this voltage may be applied is specified in the detail  
412 specification.

**413 3.16****414 rated ripple voltage**

415 RMS value of the maximum allowable alternating voltage at a specified frequency  
416 superimposed on the DC voltage at which the capacitor may be operated continuously at a  
417 specified temperature

418 Note 1 to entry: The sum of the direct voltage and the peak value of the alternating voltage applied to the  
419 capacitor does not exceed the rated voltage or temperature derated voltage, as applicable.

**420 3.17****421 reverse voltage**

422 voltage applied to the capacitor terminations in the reverse polarity direction

**423 3.18****424 rated ripple current**

425 RMS value of the maximum allowable alternating current of a specified frequency, at which  
426 the capacitor may be operated continuously at a specified temperature

**427 3.19****428 time constant**

429 product of the internal resistance (including circuit resistance) and the capacitance

430 Note 1 to entry: The time constant is normally expressed in seconds.

**431 3.20****432 internal resistance**

433 resistance component in an equivalent series circuit of capacitance and resistance of a  
434 capacitor

435 Note 1 to entry: The internal resistance is given in ohms ( $\Omega$ ).

**436 3.21****437 IR drop**

438 voltage drop between the capacitor terminals that is generated at the start of discharge and  
439 quantified by the product of the discharge current and the internal resistance of the capacitor

**440 3.22****441 maximum temperature of a capacitor**

442 temperature at the hottest point of its external surface

443 Note 1 to entry: The terminations are considered as a part of the external surface.

**444 3.23****445 minimum temperature of a capacitor**

446 temperature at the coldest point of the external surface

447 Note 1 to entry: The terminations are considered to be part of the external surface.

**448 3.24****449 minimum storage temperature**

450 minimum ambient temperature which the capacitor should withstand in the non-operating  
451 condition without damage

**452 3.25****453 maximum storage temperature**

454 maximum ambient temperature which the capacitor withstands in the non-operating condition  
455 without damage

456 [SOURCE: IEC 60384-1:202X, 3.11]

- 457 **3.26**  
458 **temperature characteristic of capacitance**  
459 maximum reversible variation of capacitance produced over a given temperature range within  
460 the category temperature range
- 461 Note 1 to entry: The term characterizing this property applies mainly to capacitors of which the variations of  
462 capacitance as a function of temperature, linear or non-linear, cannot be expressed with precision and certainty.
- 463 Note 2 to entry: The temperature characteristic of capacitance is normally expressed as a percentage of the  
464 capacitance related to a reference temperature of 20 °C.
- 465 **3.27**  
466 **visible damage**  
467 visible damage which reduces the usability of the capacitor for its intended purpose
- 468 **3.28**  
469 **leakage current**  
470 value of the current that flows through a capacitor after a charge for a fixed period of time
- 471 Note 1 to entry: Leakage current is given in amperes (A).
- 472 Note 2 to entry: Usually, it is the sum of the current for charging the capacitor, which decreases exponentially  
473 with time, and the dark current (leakage current in the original sense) of the capacitor itself.
- 474 **3.29**  
475 **maintain voltage**  
476 self discharge  
477 voltage held while being left for a fixed period of time under no load after a charge for a fixed  
478 period of time
- 479 **3.30**  
480 **temperature rise**  
481 increase of temperature of the capacitor relative to the ambient temperature resulting from the  
482 losses in the capacitor due to operation under charge and/or discharge conditions  
483 Note 1 to entry: Temperature rise is affected by ambient temperature.
- 484 **3.31**  
485 **insulated capacitor**  
486 capacitor in which all terminations of a section may be raised to a potential different (but not  
487 less than the rated voltage) from that of any conducting surface with which the case is liable  
488 to come into contact in normal use
- 489 **3.32**  
490 **uninsulated capacitor**  
491 capacitor in which one or more of the terminations of a section cannot be raised to a potential  
492 different (but not less than the rated voltage) from that of any conducting surface with which  
493 the case is liable to come into contact in normal use
- 494 **3.33**  
495 **surface mount capacitor**  
496 fixed capacitor whose small dimensions and nature or shape of terminations make it suitable  
497 for use in hybrid circuits and on printed boards
- 498 **3.34**  
499 **passive flammability**  
500 flammability caused by external heating of the component
- 501 Note 1 to entry: Passive flammability can be caused by flames for example.
- 502 **3.35**  
503 **active flammability**  
504 flammability (self-ignition) caused by internal heating of the component
- 505 Note 1 to entry: Active flammability can be caused by sparking due to insufficient internal contact for example.