



22E/247/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER: IEC 62909-3 ED1	
DATE OF CIRCULATION: 2023-03-03	CLOSING DATE FOR VOTING: 2023-05-26
SUPERSEDES DOCUMENTS: 22E/229/CD, 22E/246/CC	

IEC SC 22E : STABILIZED POWER SUPPLIES	
SECRETARIAT: Germany	SECRETARY: Mr Clemens Klemm
OF INTEREST TO THE FOLLOWING COMMITTEES: TC 64, TC 69, TC 77, TC 82, TC 120, CIS/B	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 checked="" type="checkbox"/> EMC <input type="checkbox"/> ENVIRONMENT <input type="checkbox"/> QUALITY ASSURANCE <input type="checkbox"/> SAFETY	
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TITLE:

Bi-directional grid connected power converters - Part 3: EMC requirements and test methods

PROPOSED STABILITY DATE: 2026

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BI-DIRECTIONAL GRID CONNECTED POWER CONVERTERS –

179

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Part 3: EMC requirements and test methods

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FOREWORD

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217

International Standard IEC 62909-3 has been prepared by subcommittee 22E: Stabilized power supplies, of IEC technical committee 22: Power electronic systems and equipment.

218

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

FDIS	Report on voting
22E/XX/FDIS	22E/XX/RVD

219

220

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.

221

Editors note The description above must be adequately modified.

222

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

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- 226 • reconfirmed,
227 • withdrawn,
228 • replaced by a revised edition, or
229 • amended.

230

231 The National Committees are requested to note that for this document the stability date
232 is 20XX..

233 THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE DELETED
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INTRODUCTION

237 In order to optimize power consumption, for example, within the home power management, it is
238 necessary to optimally combine electricity generation with rechargeable energy storage. This
239 optimization is accomplished, in part, by providing an efficient transfer between DC and AC
240 electricity to accommodate storage batteries. IEC 62909 standards describe a bidirectional grid-
241 connected power converter (GCPC) efficiently connected for example to sources of power
242 generation and energy storage.

243 IEC 62909-1 defines common general requirements, independent from the special
244 characteristics of individual applications. IEC 62909-2 defines the additional requirements
245 necessary for interfacing particular types of distributed energy resources to a GCPC. IEC
246 62909-3 presents the EMC requirements for GCPC.

247 GCPCs can be connected to multiple kinds of distributed energy resources. While there are
248 EMC requirements for power electronic converters for single distributed energy resources, for
249 example solar systems or battery storage systems, those requirements are in some cases
250 different from each other. Hence, it is necessary to clarify which requirements should be applied
251 to the various types of GCPCs.

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BI-DIRECTIONAL GRID CONNECTED POWER CONVERTERS –

Part 3: EMC requirements and test methods

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1 Scope

260 This part of IEC 62909 specifies electromagnetic immunity and emission requirements of bi-
261 directional grid-connected power converters (GCPCs) consisting of a grid-side inverter with two
262 or more DC ports on the application side with system voltages not exceeding 1 000 V AC or 1
263 500 V DC.

264

265 This document may also be used for special cases of GCPCs with only one DC port, where:
266 - GCPC with multiple physical DC ports is used in an application requiring only one DC port, or
267 - no dedicated product standard for such a single DC port GCPC is available.

268

269 This document considers GCPCs in both residential and non-residential environments.

270

271 This document does not cover:

- 272 - uninterruptible power supply (UPS) systems, which fall under the scope of IEC 62040 (all parts).
- 273 - power conversion equipment covered by IEC 62920, i.e. GCPCs for use in photovoltaic power
274 systems with or without DC-coupled electrical energy storage devices
- 275 - power converters to charge batteries within electric vehicles (EVs) which fall under the scope of
276 IEC 61851-21-2

277

278 NOTE 1 Annex A provides examples of GCPCs covered and not covered by this document.

279 NOTE 2 The Power Converter Subsystem (PCSS) for use in Electrical Energy Storage Systems (EESS) will be
280 referenced in a future publication of IEC 63285. In that case, that PCSS will be added to the bulleted items above.

2 Normative references

282 The following documents are referred to in the text in such a way that some or all of their content
283 constitutes requirements of this document. For dated references, only the edition cited applies.
284 For undated references, the latest edition of the referenced document (including any
285 amendments) applies.

286 IEC 61000-2-2:2002+AMD1:2017+AMD2:2018, *Electromagnetic compatibility (EMC) -*
287 *Environment - Compatibility levels for low-frequency conducted disturbances and signalling in*
288 *public low-voltage power supply systems*

289 IEC 61000-2-4:2002, *Electromagnetic compatibility (EMC) - Environment - Compatibility levels*
290 *for low-frequency conducted disturbances and signalling in public low-voltage power supply*
291 *systems*

292 IEC 61000-3-2:2020, *Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for*
293 *harmonic current emissions (equipment with input current ≤ 16 A per phase)*

294 IEC 61000-3-3:2021, *Electromagnetic compatibility (EMC) – Part 3-3: Limits – Limitation of*
295 *voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, of*
296 *equipment with rated current ≤ 16 A per phase and not subject to conditional connection*

297 IEC TR 61000-3-6:2008, *Electromagnetic compatibility (EMC) – Part 3-6: Limits – Assessment*
298 *of emission limits for the connection of distorting installations to MV, HV and EHV power*
299 *systems*

- 300 IEC 61000-3-11:2017, *Electromagnetic compatibility (EMC) - Part 3-11: Limits - Limitation of*
301 *voltage changes, voltage fluctuations and flicker in public low-voltage supply systems -*
302 *Equipment with rated current ≤ 75 A and subject to conditional connection*
- 303 IEC 61000-3-12:2021, *Electromagnetic compatibility (EMC) - Part 3-12: Limits - Limits for*
304 *harmonic currents produced by equipment connected to public low-voltage systems with input*
305 *current >16 A and ≤ 75 A per phase*
- 306 IEC 61000-4-2:2008, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and*
307 *measurement techniques – Electrostatic discharge immunity test*
- 308 IEC 61000-4-3:2020, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and*
309 *measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*
- 310 IEC 61000-4-4:2012, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and*
311 *measurement techniques – Electrical fast transient/burst immunity test*
- 312 IEC 61000-4-5:2017, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and*
313 *measurement techniques – Surge immunity test*
- 314 IEC 61000-4-6:2013, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and*
315 *measurement techniques – Immunity to conducted disturbances, induced by radio-frequency*
316 *fields*
- 317 IEC 61000-4-7:2009, *Electromagnetic compatibility (EMC) – Part 4-7: Testing and*
318 *measurement techniques – General guide on harmonics and interharmonics measurements and*
319 *instrumentation, for power supply systems and equipment connected thereto*
- 320 IEC 61000-4-11:2020, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and*
321 *measurement techniques – Voltage dips, short interruptions and voltage variations immunity*
322 *tests*
- 323 IEC 61000-4-34:2009, *Electromagnetic compatibility (EMC) – Part 4-34: Testing and*
324 *measurement techniques – Voltage dips, short interruptions and voltage variations immunity*
325 *tests for equipment with input current more than 16 A per phase*
- 326 IEC 61000-6-1:2016, *Electromagnetic compatibility (EMC) - Part 6-1: Generic standards -*
327 *Immunity standard for residential, commercial and light-industrial environments*
- 328 IEC 61000-6-2:2016, *Electromagnetic compatibility (EMC) - Part 6-2: Generic standards -*
329 *Immunity standard for industrial environments*
- 330 IEC 61800-3:2017, *Adjustable speed electrical power drive systems - Part 3: EMC requirements*
331 *and specific test methods*
- 332 IEC 61851-21-2:2018, *Electric vehicle conductive charging system - Part 21-2: Electric vehicle*
333 *requirements for conductive connection to an AC/DC supply – EMC requirements for off board*
334 *electric vehicle charging systems*
- 335 IEC 62909-1:2017, *BI-DIRECTIONAL GRID CONNECTED POWER CONVERTERS – Part 1:*
336 *General requirements*
- 337 IEC 62909-2:2019, *BI-DIRECTIONAL GRID CONNECTED POWER CONVERTERS – Part 2:*
338 *Interface of GPCP and distributed energy resources*
- 339 IEC 62920:2021, *Photovoltaic power generating systems – EMC requirements and test methods*
340 *for power conversion equipment*
- 341 IEC/TR 61000-3-14, *Electromagnetic compatibility (EMC) – Part 3-14: Assessment of emission*
342 *limits for harmonics, interharmonics, voltage fluctuations and unbalance for the connection of*
343 *disturbing installations to LV power systems*
- 344 CISPR 11:2019, *Industrial, scientific and medical equipment - Radio-frequency disturbance*
345 *characteristics - Limits and methods of measurement*

- 346 CISPR 16-1-2:2017, *Specification for radio disturbance and immunity measuring apparatus and*
347 *methods – Part 1-2: Radio disturbance and immunity measuring apparatus – Coupling devices*
348 *for conducted disturbance measurements*
- 349 CISPR 16-1-4:2020, *Specification for radio disturbance and immunity measuring apparatus and*
350 *methods – Part 1-4: Radio disturbance and immunity measuring apparatus – Antennas and test*
351 *sites for radiated disturbance measurements*
- 352 CISPR 32:2019, *Electromagnetic compatibility of multimedia equipment – Emission*
353 *requirements*
- 354
- 355

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366 **3 Terms, definitions**

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

368 ISO and IEC maintain terminological databases for use in standardization at the following
369 addresses:

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

362 Table 1 provides an alphabetical cross-reference listing of terms.

363 **Table 1 – Alphabetical list of terms**

Term	Term number	Term	Term number	Term	Term number
AC mains power port	3.9	electric vehicle	3.7	photovoltaic	3.21
AE	3.2	electric road vehicle	3.7	PV	3.21
AMN	3.22	EV	3.7		
associated equipment	3.2	EV section	3.8	residential location	3.3
artificial DC network	3.23				
artificial mains network	3.22	GCPC	3.1	signal and control port	3.13
auxiliary AC power port	3.10	grid-connected power converter	3.1	signal and control port	3.13
auxiliary DC power port	3.12				
		high power electronic systems and equipment	3.19	wired network port	3.14
bi-directional grid-connected power converter	3.1				
conductive power transfer port	3.15	LV	3.20		
CPT port	3.15	low voltage	3.20		
DC artificial network	3.23				
DC power port	3.11	PLC	3.16		
DC/DC converter	3.17	PLT	3.16		
DC-AN	3.23	port	3.4		
distributed energy resources	3.18	port, <in electromagnetic compatibility>	3.5		
		powerline communication	3.16		
enclosure port	3.6	powerline technology	3.16		

364

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366 **3.1**367 **bi-directional grid-connected power converter**368 **grid-connected power converter**369 **GCPC**370 power converter with multiple DC ports connected to an a.c. mains power distribution network
371 or other a.c. mains installation and used in a power generating system

372 Note 1 to entry: in special cases GCPCs can have only one DC power port.

373 Note 2 to entry: for bi-directional GCPCs the energy flow can be from AC to DC or DC to AC.

374 [SOURCE: CISPR 11:2015/AMD2:2019, 3.11, modified – addition of the words “with multiple
375 DC ports” and the note has been added.]

376

377 **3.2**

378 **associated equipment**

379 **AE**

380 equipment needed to verify the functionality, to help exercise the EUT, and / or monitoring

381 [SOURCE: IEC 61851-21-2:2018, 3.1, modified - A word " exercise" have been replaced by "
382 verify the functionality, to help exercise the EUT "]

383

384 **3.3**

385 **residential location**

386 area of land designated for domestic dwellings where the mains power within these locations is
387 directly connected to the low-voltage public mains network

388

389 Note 1 to entry: Examples of residential locations are: houses, apartments, farm buildings housing people.

390 Note 2 to entry: A dwelling can be a single building, separate building or a separate section of a larger building.

391 Note 3 to entry: Within these locations it is expected to operate a radio receiver within a distance of 10 m from the
392 equipment.

393 Note 4 to entry: Domestic dwellings are places for one or more people to live.

394 [SOURCE: IEC 61000-6-3:2020, 3.1.14]

395 **3.4**

396 **port**

397 access to a device or network where electromagnetic energy or signals may be supplied or received
398 or where the device or network variables may be observed or measured

399 [SOURCE: IEC 131-12-60]

400

401 **3.5**

402 **port**, <in electromagnetic compatibility>

403 particular interface of the GCPC with the external electromagnetic environment

404 Note 1 to entry: See Figure 1 for examples of ports.

405

406 [SOURCE: IEC 61000-6-3:2020, 3.1.1, modified - A word "specified apparatus" have been
407 replaced by "GCPC" and Figure 1 has been replaced.]

408