



DPC: 23 / 30456150 DC

BSI Group Headquarters

389 Chiswick High Road London W4 4AL

Tel: +44 (0)20 8996 9000

Fax: +44 (0)20 8996 7400

www.bsigroup.com

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Interested committees:

Title: BS EN IEC 60095-8 Lead-acid starter batteries

Part 8 : 12V Batteries used in automobiles for auxiliary or backup purposes

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Responsible Committee Secretary: **Ms Nicola Young (BSI)**

Direct tel:

E-mail: nicola.young@bsigroup.com

Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



21/1175/CD

COMMITTEE DRAFT (CD)

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DATE OF CIRCULATION:

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CLOSING DATE FOR COMMENTS:

2023-11-24

SUPERSEDES DOCUMENTS:

21/1138/NP, 21/1145/RVN

IEC TC 21 : SECONDARY CELLS AND BATTERIES

SECRETARIAT:

France

SECRETARY:

Mr Yves BOUDOU

OF INTEREST TO THE FOLLOWING COMMITTEES:

PROPOSED HORIZONTAL STANDARD:



Other TC/SCs are requested to indicate their interest, if any, in this CD to the secretary.

FUNCTIONS CONCERNED:

☐ EMC

☐ ENVIRONMENT

☐ QUALITY ASSURANCE

☐ SAFETY

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TITLE:

Lead-acid starter batteries - Part 8 : 12V Batteries used in automobiles for auxiliary or backup purposes

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CONTENTS

1		
2	FOREWORD.....	3
3	1 Scope.....	4
4	2 Normative references	5
5	3 Terms and definitions	5
6	4 Designation of batteries for Auxiliary or Backup applications	7
7	5 Condition on delivery	7
8	6 General requirements	7
9	7 Functional characteristics	7
10	7.1 Electrical characteristics	7
11	7.2 Mechanical characteristics	8
12	8 General test conditions	9
13	9 Tests methods.....	12
14	9.1 20 h capacity check C_e	12
15	9.2 Reserve capacity check RC_e	12
16	9.3 CCA(AUX) test at -18°C.....	12
17	9.4 Pulse Power Characterization (PPC) – Procedures.....	13
18	9.5 Pulse Power Characterization test - BOL	16
19	9.6 Pulse Power Characterization test - EOL	17
20	9.7 Charge acceptance test	18
21	9.8 Charge Recovery test	18
22	9.9 Endurance test for batteries	19
23	9.9.1 Corrosion test.....	19
24	9.9.2 Cycling test 50 % DoD.....	20
25	9.9.3 Cycling test 17,5 % DoD	21
26	9.9.4 High Temperature cycle life test at 75°C (optional)	22
27	9.10 Charge retention test	22
28	9.11 Electrolyte retention test	22
29	9.12 Vibration resistance test	22
30	9.13 Water consumption test	22
31	10 Requirements	23
32	Annex A (reference) Power Performance Characterization.....	27

INTERNATIONAL ELECTROTECHNICAL COMMISSION

LEAD-ACID STARTER BATTERIES –

Part 8: 12V BATTERIES USED IN AUTOMOBILES FOR AUXILIARY OR BACKUP PURPOSES

FOREWORD

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PURPOSE AND JUSTIFICATION

WITH THE GROWTH OF xEV VEHICLES (VEHICLES FEATURING INCREASING DEGREES OF ELECTRIFICATION), 12V BATTERIES ARE BEING USED TO SUPPORT 12V FUNCTIONS ALSO IN CASE WHERE THE ICE (INTERNAL COMBUSTION ENGINE) IS NOT PRESENT OR IS COUPLED WITH A HIGH VOLTAGE ELECTRICAL ENGINE, THUS NOT REQUIRING OR HAVING LIMITED ENGINE CRANKING FUNCTIONALITIES. ADDITIONAL FUNCTIONALITIES LIKE THE ONES RELATED TO FUNCTIONAL SAFETY (E.G. IN CASE OF DISRUPTION OF THE MAIN HIGH VOLTAGE ENERGY SOURCE) REQUIRE NEW METHODS FOR ESTABLISHING THE POWER CAPABILITY OF SUCH BATTERIES WHEN REQUESTED TO PROVIDE THE FUNCTION, AS WELL AS POTENTIAL DIFFERENT AGEING MECHANISMS RELATED TO DIFFERENT USAGE PROFILES (E.G. EXTENDED FLOAT CHARGE EXPOSURE).

CURRENT PRODUCTION VEHICLES, INCLUDING SOME ICE / START STOP VEHICLES, BUT MAINLY xEV (HEV, PHEV, BEV) ALREADY FEATURE ONE OR MORE LOW VOLTAGE (12V) SUPPORT BATTERIES AND ARE SUPPOSED TO EQUIP SUCH BATTERIES AS FAR AS A LOW VOLTAGE BOARD NET WILL BE PART OF THE ELECTRICAL SYSTEM OF THE VEHICLES.

1 Scope

This part of IEC 60095 is applicable to lead acid batteries with a nominal voltage of 12 V, for automobile passenger cars applications, used as auxiliary energy storage and power source in vehicles, but not featuring the classical function of engine starting / cranking. This includes applications in battery-electric vehicles, as well as in vehicles with an internal combustion engine (ICE) that is started out of another (12 V, 48 V or high-volt) battery. This standard can be used for batteries with backup purposes.

Batteries defined for auxiliary or backup purposes relate to vehicle applications which are very diverse and undergo fast technical changes. However, they can typically be associated with one of the following three categories:

- **Category (1):** 12V central-storage (main) battery, with most functions of modern automotive batteries except engine starting. These functions typically include: power supply during parking, vehicle activation and after-run, over-the air update and as well transient power delivery and absorption, along with voltage stabilization, during normal vehicle operation.

Such batteries are typically sized for energy or capacity (e.g., to support parking loads for a certain duration) *and* power or high-rate discharge current (e.g., powering electric chassis actuators) simultaneously. As 12 V batteries in electric vehicles can be recharged out of the traction battery while parking, and as cold-cranking performance is not a requirement, they are often downsized and then subjected to higher relative cyclic throughput at greater depth-of-discharge, compared to a starter or micro-hybrid battery in an ICE vehicle with otherwise identical electrical loads.

Emergency power support might be required in system architectures where such functionality is not supported by any additional dedicated energy and power source

Requirements for category (1) shall take into account significant capacity throughput during life and appropriate voltage response when supporting high rate discharge currents

- **Category (2):** 12 V backup battery that is stabilizing voltage and providing emergency power for a sensitive – often safety relevant – electrical component or sub-net of the power supply system. Such batteries are often disconnected from the 12 V loads when alternator or dc/dc converter are not feeding the 12 V system, protecting them from discharge while parking etc. In such cases, the operating state-of-charge (SOC) range may be narrow (and close to fully charged) and cycle-life requirements only moderate or low.

Requirements for category (2) shall take into account limited capacity throughput during life and appropriate voltage response when supporting high rate discharge currents, which can be variable depending on applications and vehicle manufacturer

- **Category (3):** 12 V auxiliary batteries in stop/start or micro-hybrid vehicles that stabilize system voltage during engine restart, which would be powered out of the 12 V starter battery. This application is similar to the backup case described above, but battery discharge occurs frequently during normal operation, and is not safety relevant.

Requirements for category (3) shall take into account relevant capacity throughput during life and limited power requirements.

This document specifies the:

- general requirements;
- essential functional characteristics, relevant test methods and results required, for several classes of batteries:
 - according to the general type of application
 - according to the type of product

- according to the categories as previously defined

2 Normative references

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

IEC 60050-482, *International Electrotechnical Vocabulary (IEV) – Part 482: Primary and secondary cells and batteries*

IEC 60095-1:2018, *Lead-acid starter batteries – Part 1: General requirements and methods of test*

IEC 60095-2:2021, *Lead-acid starter batteries – Part 2: Dimensions of batteries and dimensions and marking of terminals*

IEC 60095-6:2019, *Lead-acid starter batteries – Part 6: Batteries for micro-cycle applications*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-482 and the following apply.

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

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

3.1.1

flooded battery

lead-acid battery having a cover provided with one or more openings through which gaseous products may escape

3.1.2

enhanced flooded battery

EFB battery

Flooded lead-acid battery with additional special design features to significantly improve the cycling capability compared to standard flooded batteries

3.1.3

valve regulated lead-acid battery

VRLA battery

Lead-acid battery which is closed under normal conditions but which has an arrangement that allows the escape of gas if the internal pressure exceeds a predetermined value

NOTE 1 to entry - The VRLA battery cannot receive addition to the electrolyte and after activation of dry-charged VRLA.

NOTE 2 to entry - In VRLA batteries the electrolyte is immobilized.

3.1.4

absorbent glass mat battery

AGM battery

VRLA battery in which the electrolyte is immobilized by absorption in a glass mat

3.1.5

gel battery

VRLA battery in which the electrolyte is immobilized by fixing as a gel

183 3.2 Abbreviated terms and symbols

184	EN	European Standard (Euro Norm) created by CENELEC (European Committee for
185		Electrotechnical Standardization)
186		
187	CHA	Charge Battery; to be charged with given parameters
188	DCA	Dynamic charge acceptance
189	DCH	Discharge Battery; to be discharged with given parameters
190	PAU	Pause; no charging or discharging but measurement of voltage as required. If the battery is
191		connected to the test unit, there shall be no quiescent current
192	RPT	Repeat; instruction to repeat certain steps several times
193	C_e	Effective capacity [Ah]
194	C_n	Nominal capacity [Ah]
195	C_{rch}	Recharged capacity [Ah]
196	DoD	Depth of discharge [% of C_n]
197	BOL	Beginning of Life
198	EOS	End of step
199	EOL	End of Life
200	I_{CHA}	Charge current [A]
201	I_{CC}	Discharge current for cranking [A]
202	I_{DCA}	Weighted normalized dynamic charge acceptance, measured in A per Ah nominal capacity
203		C_n [A/Ah]
204	I_{DCH}	Discharge current [A]
205	I_n	Nominal discharge current [A], $I_n [A] = C_n [Ah] / 20 [h]$
206	Q_{CHA}	Charged capacity [Ah]
207	Q_{DCH}	Discharged capacity [Ah]
208	R_i	Internal resistance [Ω]
209	RC	Reserve capacity (discharge with a fixed current of 25 A to $U = 10,5$ V), used in DCA test
210	SoC	State of charge
211	t_{DCH}	Discharge time [s]
212	U_c	Charging voltage [V]
213	U_{EOD}	Voltage at the end of discharge step [V]
214	U_{EOS}	Voltage at the end of step [V]
215		
216	PPC	Pulse power characterization
217		
218		
219		
220		

221

222 **4 Designation of batteries for Auxiliary or Backup applications – Electrolyte** 223 **density and open circuit voltage**

224 **4.1 Designation according to type**

225 Subclause 4.1 of IEC 60095-1:2018 is applicable

226 **5 Condition on delivery**

227 Clause 5 of IEC 60095-1:2018 is applicable

228 **6 General requirements**

229 **6.1 Identification, labelling**

230 **6.1.1 General**

231 Batteries according to this document shall bear the following characteristics on at least the top or
232 one of their four sides.

233 **6.1.2 The identification of manufacturer or supplier**

234 The name of the manufacturer or supplier shall be indicated.

235 **6.1.3 Nominal voltage: 12 V**

236 The nominal voltage of 12 V shall be indicated.

237 **6.1.4 Capacity or reserve capacity and nominal high rate current CCA(AUX)**

238 Subclause 6.1.4 of IEC 60095-1:2018 is applicable

239 **6.1.5 Production date code**

240 Batteries shall be marked with the date of production. This can be part of a more complex code.

241 **6.1.6 Safety labelling**

242 Subclause 6.1.6 of IEC 60095-1:2018 is applicable

243 **6.1.7 Recycling labelling**

244 Subclause 6.1.7 of IEC 60095-1:2018 is applicable

245 **6.1.8 Valve-regulated batteries**

246 Subclause 6.1.8 of IEC 60095-1:2018 is applicable

247 **6.2 Marking of the polarity and fastening of the battery**

248 For battery whose dimensions are defined by IEC 60095-2, the terminals shall be identified
249 according to the requirements of IEC 60095-2. Where batteries are fastened to the vehicle by means
250 of integral parts (for example, bottom ledges), these shall be in compliance with the requirements
251 of IEC 60095-2

252 **7 Functional characteristics**

253 **7.1 Electrical characteristics**

254 **7.1.1** The 20 h capacity, the reserve capacity and the charge retention have the same definition
255 as in IEC 60095-1:2018.

256 **7.1.2** Water consumption has the same definition as in IEC 60095-1:2018.

257 **7.1.3** The high rate discharge performance CCA(AUX) is the discharge current I_{cc} , as indicated
258 by the manufacturer which a battery can supply according to 9.3. Being cranking not a requested
259 feature, the test result shall be used as parameter for the Power Pulse Characterization (PPC)
260 procedure.

- 261 **7.1.4** The capacity is defined for a temperature of $25\text{ °C} \pm 2\text{ °C}$. It may be indicated by the
262 manufacturer as either:
- 263 • nominal 20 h capacity C₂₀,
 - 264 • or nominal reserve capacity RC_n.
- 265 C₂₀ and RC_n are defined in IEC 60095-1:2018 in 7.1.2.
- 266 **7.1.5** The power pulse characterization (PPC) is a sequence of progressively increasing short
267 pulses at constant current, where current is fixed within a defined range or proportional to
268 the nominal current I_{cc} , and executed at full or partial state of charge and low
269 temperature:
- 270 • at the beginning of life, as part of the initial characteristics sequence
 - 271 • at the end of life or when the specification target (number of cycles, number of units) of the
272 intended performance class compliance level is achieved
- 273 **7.1.6** the charge acceptance (at 0 °C) defined in IEC 60095-1:2018, 7.1.3.
- 274 **7.1.7** the charge recovery test (at 25 °C) is a specific requirement based on specific usage
275 profiles more aligned with current applications and looking over charge performance on a
276 longer timespan
- 277 **7.1.8** The charge retention is defined in IEC 60095-1:2018, 7.1.4.
- 278 **7.1.9** The endurance test consists in four parts:
- 279 • the "corrosion test" represents the ability of a battery to perform repeated overcharge/storage
280 periods.
 - 281 • the "cycling test 17,5 % DoD" represents the ability to deliver energy under high cyclic
282 conditions in a partially discharged state of charge.
 - 283 • the "cycling test 50 % DoD" represents the ability of a battery to perform repeated discharge/
284 recharge cycles and long rest periods on open circuit. This ability shall be tested by a series of
285 cycles and rest periods under specified conditions after which the cold cranking or the capacity
286 performances shall be determined.
 - 287 • The "high temperature cycle life test" represents the ability to perform repeated cycles of
288 charge and discharge, at high environmental temperature, and the ability to provide high
289 current pulses during an ageing process driving a progressive increase of battery internal
290 resistance. Test is optional, recommended for batteries intended to be used in warm
291 applications and/or climate zones.
- 292
- 293 **7.1.10** The water consumption is defined in IEC 60095-1:2018, 7.1.6.
- 294
- 295 **7.2 Mechanical characteristics**
- 296 **7.2.1** The vibration resistance and the electrolyte retention have the same definitions as in IEC 60095-
297 1.
- 298 **7.2.2** "Vibration resistance" represents the ability of a battery to maintain service under periodic or
299 irregular acceleration forces. Minimum requirements shall be verified by a test (see 9.7).
- 300 **7.2.3** "Electrolyte retention" is the ability of a battery to retain the electrolyte under specified physical
301 conditions (see 9.8).
- 302