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harnesses Part 2:
Definitions, test methods and general performance requirements

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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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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 Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

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- **Annotated drafts are not acceptable and will be rejected.**
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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.	

DRAFT INTERNATIONAL STANDARD

ISO/DIS 8092-2

ISO/TC 22/SC 32

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Voting begins on:
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2023-03-13

Road vehicles — Connections for on-board electrical wiring harnesses —

Part 2:

Definitions, test methods and general performance requirements

Véhicules routiers — Connexions pour faisceaux de câblage électrique embarqués —

Partie 2: Définitions, méthodes d'essai et exigences de performances générales

ICS: 43.040.10

This document is circulated as received from the committee secretariat.

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81 **Foreword**

82 ISO (the International Organization for Standardization) is a worldwide federation of national standards
 83 bodies (ISO member bodies). The work of preparing International Standards is normally carried out
 84 through ISO technical committees. Each member body interested in a subject for which a technical
 85 committee has been established has the right to be represented on that committee. International
 86 organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO
 87 collaborates closely with the International Electrotechnical Commission (IEC) on all matters of
 88 electrotechnical standardization.

89 The procedures used to develop this document and those intended for its further maintenance are
 90 described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the
 91 different types of ISO documents should be noted. This document was drafted in accordance with the
 92 editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

93 Attention is drawn to the possibility that some of the elements of this document may be the subject of
 94 patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any
 95 patent rights identified during the development of the document will be in the Introduction and/or on
 96 the ISO list of patent declarations received (see www.iso.org/patents).

97 Any trade name used in this document is information given for the convenience of users and does not
 98 constitute an endorsement.

99 For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and
 100 expressions related to conformity assessment, as well as information about ISO's adherence to the World
 101 Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see
 102 www.iso.org/iso/foreword.html.

103 This document was prepared by Technical Committee ISO/TC 22, Road vehicles, Subcommittee SC 32,
 104 *Electrical and electronic components and general system aspects*.

105 This **fifth** edition cancels and replaces the **fourth** edition (ISO 8092-2:2005), which has been technically
 106 revised.

107 The main changes compared to the previous edition are as follows:

- 108 — adoption of the content according to new technical requirements,
- 109 — adoption of the content according to the new version of the ISO guidelines,
- 110 — correction of the typos and mistakes in the text,
- 111 — alignment of the content regarding to the referred standards,
- 112 — section 4.24 Flowing gas corrosion test has been removed due to its technical irrelevance,
- 113 — Annex A (normative) Additional cable dimensions is adopted as an informative part under section
 114 4.1.2,
- 115 — Annex B (informative) Cable attachment by insulation-displacement connection (IDC) — Bending
 116 test has been removed due to its technical irrelevance.

117 A list of all parts in the ISO **8092** series can be found on the ISO website.

118 Any feedback or questions on this document should be directed to the user's national standards body. A
 119 complete listing of these bodies can be found at www.iso.org/members.html.

Road vehicles — Connections for on-board electrical wiring harnesses — Part 2: Definitions, test methods, and general performance requirements

1 Scope

This document defines terms and specifies test methods for general performance requirements of voltage class A connectors used in electrical wiring harnesses on road vehicles.

This document applies to connectors which, after mounting in the vehicle, are designed to only be disconnected in connection with repair and maintenance.

This part of ISO 8092 does not apply to internal connections for electronic devices.

This part of ISO 8092 does not apply to signal communication quality or data integrity.

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.

ISO DIS 8092-5, *Road vehicles — Connections for on-board electrical wiring harnesses – Part 5: Automotive parts – Test methods and general performance requirements for wiring harness connector operation*

ISO 16750-3, *Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 3: Mechanical loads*

ISO 16750-4, *Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 4: Climatic loads*

ISO 16750-5, *Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 5: Chemical loads*

ISO 19642 (all parts), *Road vehicles — Automotive Cables*

ISO 20653, *Degrees of protection (IP-code) — Protection against foreign objects, water and access – Electrical equipment*

147 3 Terms and definitions

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

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

150 — ISO Online browsing platform: available at <https://www.iso.org/obp>

151 — IEC Electropedia: available at <http://www.electropedia.org/>

152 3.1

153 **voltage class A**

154 classification of an electric component or circuit with a maximum working voltage of ≤ 30 V AC (rms) or
155 ≤ 60 V DC, respectively

156 [SOURCE: ISO 21498-1:2021]

157 [SOURCE: ISO 6469-3:2021]

158 3.2

159 **housing**

160 housing for inserting the terminal and providing insulation between terminals

161

162 3.3

163 **cable attachment**

164 any permanent junction of cable to terminal

165 Note 1 to entry: Crimp and weld are typical methods

166 Note 2 to entry: Terms related to cables ISO 19642-1

167 3.4

168 **connector**

169 assembly of terminal, housing and related parts that terminate cable for the purpose of providing
170 connection and disconnection to a suitable mating connector

171 3.5

172 **connector coding**

173 mechanical feature to provide differentiation, preventing mating of connectors not intended to be mated

174 3.6

175 **connector polarization**

176 method or design feature, which prevents connectors that are intended to mate from mating in an
177 unintended orientation, rotation, or angular position, whilst allowing mating in the intended manner

178 3.7

179 **connector position assurance, CPA**

180 device that prevents accidental release of the connector lock and serves as an indicator of full connector
181 mating

3.8**terminal position assurance, TPA**

a feature installed or seated after the terminals are inserted into their housing to assure that the terminals are properly positioned, and which reinforces the primary terminal locking mechanism or provides a separate, redundant terminal lock

3.9**socket and receptacle terminal**

terminal, including means for cable attachment, designed for electrical engagement on its inner surface, and to accept entry of a pin or tab terminal, thus forming an electrical connection. See Figure 1 for example.

Note 1 to entry: Socket and receptacle terminals are sometimes referred to as female terminals.



Figure 1— Example of a socket and a receptacle terminal

3.10**pin and tab terminal**

terminal, including means for cable attachment, designed for electrical engagement on its outer surface and to enter a socket or a receptacle terminal, thus forming an electrical connection. See Figure 2 for example.

Note 1 to entry: Pin and tab terminals are sometimes referred to as male terminals"

Note 2 to entry: Tab terminals are sometimes referred to as blade terminals



Figure 2— Example of a pin and a tab terminal

3.11**multi-pole connection**

two mated connector halves with more than one terminal pair (for example one receptacle and one tab terminal)

209 4 Test conditions and requirements

210 4.1 General

211 4.1.1 Preconditioning for environmental and mechanical durability test

212 All test samples shall be preconditioned at a standard ambient temperature of $(23 \pm 5) ^\circ\text{C}$, and $(25-75) \%$
213 relative humidity for 24 h before the start of any test sequence.

214 [SOURCE: ISO 16750-1]

215 4.1.2 Test conditions

216 All tests shall be carried out at a standard ambient temperature of $(23 \pm 5) ^\circ\text{C}$ and $(25-75) \%$ relative
217 humidity unless otherwise stated in the test procedure. This is referred to as room temperature (RT).

218 Cable in compliance with applicable part of ISO 19642 is recommended. The cable or cables used shall be
219 specified in the test report.

220 The cross-sectional area of the wire mentioned in this specification refers to wires with a copper
221 conductor.

222 When the wire conductor is of a material other than copper, the cross-sectional area of the wire shall be
223 specified by agreement between customer and supplier.

224 Cable attachment shall be performed in accordance with the terminal manufacturer's specifications, or
225 as agreed between customer and supplier.

226 Care shall be taken so that test samples do not influence each other (e.g., in a heat chamber).

227 Each connector shall have the full complement of terminals fitted unless otherwise specified.

228 The terminals and connectors used in the test shall be fully assembled unless otherwise specified.

229 Connectors shall be tested in mated condition unless stated otherwise. In the case of a connector
230 connecting directly to a device, a mating dummy may be used to carry out tests. This dummy must
231 represent the intended device's interface and electrical properties.

232 For connector mechanical tests, unless otherwise specified, fix the pin or tab housing of the unmated or
233 mated connector in the appropriate fixture on the tension or force tester. Secure the other side in the
234 appropriate fixture and insert or pull the socket or receptacle housing straight in/out. Straight-in or
235 straight-out engagement is critical to avoid side loads and binding which can affect force measurements.

236 For terminal mechanical tests, unless otherwise specified, fix the pin or tab terminal of the unmated or
237 mated terminal in the appropriate fixture on the tension or force tester. Secure the other side in the
238 appropriate fixture and insert/pull the socket receptacle terminal straight in/out. Straight-in or straight-
239 out engagement is critical to avoid side loads and binding which can affect force measurements

240 Measurements shall be taken on all terminals regardless of the number of poles per connector, unless
241 otherwise specified in the test methods or by agreement between customer and supplier.

242 Lubrication or other means of attaining better test results shall not be added to any surface unless
243 representative of assembly conditions. Production-related remains of lubricants on the terminals are
244 permitted.

245 Unless otherwise specified, all forces shall be applied at a constant speed of (50 ± 10) mm/min.

246 Unless otherwise specified, when a temperature of $T_{\max}$ is specified in a test, the applicable “Highest value”
 247 temperature as per Table 1 shall be used. When a temperature of $T_{\min}$ is specified in a test, the applicable
 248 “Lowest value” temperature as per Table 1 shall be used.

249 **Table 1 — Environmental and test temperatures**

Class	Typical application	Environmental temperature range °C		Test temperature Short term thermal ageing °C ± 2 °C
		Lowest value Use for $T_{\min}$ of chamber ± 2 °C	Highest value Use for $T_{\max}$ of chamber ± 2 °C	
		-40		
T1 (G)	interior		85	100
T2 (J)	passenger compartment		100	125
T3 (O)	engine compartment		125	150
T4 (R)	engine applications used near hot components		150	175
T5 (N/A)	for use as needed		175	200 *
() value aligned with ISO 16750-4:2010, Table 1				
* or agreed between customer and supplier				

250

251 NOTE $T_{\min}$ and $T_{\max}$ apply to all environmental chamber temperatures where $T_{\min}$ and $T_{\max}$ are specified as
 252 using the applicable environmental temperature range except 7.2.2.1 Short term Thermal aging

253 **4.1.3 Test sequences and sample quantities**

254 **Table 2,**

255 **Table 3, Table 4** and Table 5 list the test sequences. The test groups in the tables apply to sealed and
 256 unsealed connectors as noted. New samples shall be used for each test group. The test sequence for each
 257 test group shall be performed in accordance with the sequence number defined in the table's rows for
 258 each sequence. For each test group, the complete test sequence for the group on each sample shall be
 259 performed.

260 **Table 2—Mechanical test sequences groups A through H**

Test group identification		A	B	C	D	E	F	G	H
u=apply test if samples are unsealed		u	u	u	u	u	u	u	u
s=apply test if samples are sealed		s	s	s	s	s	s	s	s
Minimum test quantity of terminals/connectors		10	10	10	10	10	10	10	10
Sample cable length (mm)		-	-	-	-	-	-	-	-
Sample cable size	Maximum	-	-	-	-	-	-	-	-
	Minimum	-	-	-	-	-	-	-	-
4.2 Visual Examination		1, 3	1, 3	1,3	1, 3	1, 3	1, 3	1,3	1,4
5.1 Connection and disconnection		2 ^g							
5.2 Mating force – measurement and classification			2						
5.3 Unlocking force – measurement and classification				2					
5.4 Unmating force – measurement and classification					2				
5.5 Locking device strength						2			
5.6 Unintentional lever release force							2		
5.7 Locking force for CPA function								2	2
5.8 Disengage force for CPA function									3
g Perform force measurement for first mate and first unmate with part held in force tester. Remaining mate and unmate cycles can be either hand mated or using the mechanized force test machine. - Cells containing "-" to be defined between supplier and customer. Selection typically does not matter to test result.									

261

262

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Table 3—Mechanical test sequences groups I through P

Test group identification		I	J	K	L	M	N	O	P
u=apply test if samples are un-sealed		u	u	u	u	u	u	u	u
s=apply test if samples are sealed		s	s	s	s	s	s	s	s
Minimum test quantity of terminals/connectors		10 ^f	10 ^f	10	10	20 ^f	10 ^f	10 ^f	10 ^k
Sample cable length (mm)		-	-	-	-	-	-	-	>50
Sample cables size	Maximum	-	-	-	-	10	10	10	See "l"
	Minimum	-	-	-	-	10	-	-	See "l"
4.2 Visual Examination		1, 3	1, 4	1, 3	1, 3	1, 4	1, 3	1, 3	1, 3
5.9 Locking force for TPA		2	2						
5.10 Disengage force for TPA			3						
5.11 Effectiveness of connector coding and polarization				2					
5.12 Connector engagement sound					2				
5.13 Terminal insertion force (TPA disengaged)						2			
5.14 Terminal insertion force (TPA engaged)							2		
5.15 Terminal insertion force with incorrect orientation								2	
5.16 Terminal extraction force						3			
5.17 Tensile strength of connection between terminal and wire									2
^f Use unmated wire harness connector; the mating (header) connector is not used in the test. ^k Sample is made from terminal and cable only. ^l Test quantity is per terminal/cable combination; each combination shall be validated with a 10-piece sample, minimum. - Cells containing "-" to be defined between supplier and customer. Selection typically does not matter to test result.									

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Table 4— Environmental and electrical test sequence groups Q through W

Test group identification		Q	R	S	T	U	V	W
u=apply test if samples are unsealed		u	u	u	u	u	u	
s=apply test if samples are sealed		s	s	s	s ^q	s	s	s ^q
Minimum test quantity of connectors		5 ⁱ	10	5 ⁱ	5	5	5	5
Sample cable length (mm)		500	-	min 500	min 150	-	1 250	Min 150
Sample cable size	Maximum	See "p"	all	all		all		
	Minimum				all		all	all
4.2 Visual Examination		1	1, 6	1, 8, 10	1, 10, 14	1, 8	1, 3	1, 7
5.1 Connection and disconnection		2	2	2	2	2		
5.3 Unlocking force – measurement and classification					12 ^c			
5.6 Unintentional lever release force					12 ^c			
5.8 Disengage force for CPA function					11			
5.16 Terminal extraction force				9				
6.1 Connection resistance (voltage drop)			3, 5	3, 6	3, 7, 13	3, 5, 7		2, 5
6.2 Temperature rise		3 ^j		(4), 7				
6.4 Insulation resistance					4, 8			
6.5 Withstand voltage					5, 9			3, 6
7.1 Thermal shock			4					
7.2 Thermal aging				5				
7.3 Temperature / humidity					6 ⁿ			
7.4 Vibration with thermal cycling						6 ^d		
7.5 Mechanical shock						4 ^d		
7.6 Drop							2	
7.10 Salt spray								4
c Perform either 5.3 or 5.6 as applicable. d It is allowed to apply each shock/vibration direction directly before the vibration test for this direction. Take intermediate resistance measurements between testing for each axis. i Samples require thermocouples to measure or monitor temperature rise. j This test is to estimate initial current in test part. n Perform insulation resistance during condensation phase. p Test all cable sizes that are applicable. q Seal cable on far end. () It is possible to omit this step by agreement between customer and supplier. - Cells containing "-" to be defined between supplier and customer. Selection typically does not matter.								

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268