

DRAFT INTERNATIONAL STANDARD

ISO/DIS 16750-5

ISO/TC 22/SC 32

Secretariat: JISC

Voting begins on:
2022-06-06

Voting terminates on:
2022-08-29

Road vehicles — Environmental conditions and testing for electrical and electronic equipment —

Part 5: Chemical loads

*Véhicules routiers — Spécifications d'environnement et essais de l'équipement électrique et électronique —
Partie 5: Contraintes chimiques*

ICS: 43.040.10

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO/FDIS 16750-5](#)

<https://standards.iteh.ai/catalog/standards/sist/d1cf2c7b-2839-4648-86b7-a1302e534a29/iso-fdis-16750-5>

THIS DOCUMENT IS A DRAFT CIRCULATED FOR COMMENT AND APPROVAL. IT IS THEREFORE SUBJECT TO CHANGE AND MAY NOT BE REFERRED TO AS AN INTERNATIONAL STANDARD UNTIL PUBLISHED AS SUCH.

IN ADDITION TO THEIR EVALUATION AS BEING ACCEPTABLE FOR INDUSTRIAL, TECHNOLOGICAL, COMMERCIAL AND USER PURPOSES, DRAFT INTERNATIONAL STANDARDS MAY ON OCCASION HAVE TO BE CONSIDERED IN THE LIGHT OF THEIR POTENTIAL TO BECOME STANDARDS TO WHICH REFERENCE MAY BE MADE IN NATIONAL REGULATIONS.

RECIPIENTS OF THIS DRAFT ARE INVITED TO SUBMIT, WITH THEIR COMMENTS, NOTIFICATION OF ANY RELEVANT PATENT RIGHTS OF WHICH THEY ARE AWARE AND TO PROVIDE SUPPORTING DOCUMENTATION.

This document is circulated as received from the committee secretariat.



Reference number
ISO/DIS 16750-5:2022(E)

© ISO 2022

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO/FDIS 16750-5

<https://standards.iteh.ai/catalog/standards/sist/d1cf2c7b-2839-4648-86b7-a1302e534a29/iso-fdis-16750-5>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2022

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36

Contents

Foreword..... iii

1 Scope.....1

2 Normative references1

3 Terms and definitions1

4 Tests.....1

 4.1 General.....1

 4.2 Purpose.....2

 4.3 General test conditions.....2

 4.4 DUT conditioning.....2

 4.5 Test agent conditioning.....2

 4.6 Application method3

 4.7 Test conditions3

 4.8 Procedure.....5

 4.9 Requirements5

5 Documentation.....5

Bibliography.....8

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO/FDIS 16750-5](https://standards.iteh.ai/catalog/standards/sist/d1cf2c7b-2839-4648-86b7-a1302e534a29/iso-fdis-16750-5)
<https://standards.iteh.ai/catalog/standards/sist/d1cf2c7b-2839-4648-86b7-a1302e534a29/iso-fdis-16750-5>

37 Foreword

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

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

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

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

55 For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and
56 expressions related to conformity assessment, as well as information about ISO's adherence to the World
57 Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL:
58 www.iso.org/iso/foreword.html

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

61 This third edition cancels and replaces the second edition (ISO 16750-5:2010), which has been
62 technically revised.

63 The main change compared to the previous edition is that the contents of ISO 19453-5 defining the
64 environmental conditions and testing for electrical and electronic equipment for drive system of electric
65 propulsion vehicles "Chemical loads" were merged.

66 A list of all parts in the ISO 16750 series can be found on the ISO website.

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

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO/FDIS 16750-5

<https://standards.iteh.ai/catalog/standards/sist/d1cf2c7b-2839-4648-86b7-a1302e534a29/iso-fdis-16750-5>

69 **Road vehicles — Environmental conditions and testing for**
70 **electrical and electronic equipment — Part 5: Chemical loads**

71 **1 Scope**

72 This document applies to electric and electronic systems and components for vehicles including electric
73 propulsion systems and components with maximum working voltages according to voltage class B. It
74 describes the potential environmental stresses and specifies tests and requirements recommended for
75 the specific mounting location on/in the vehicle.

76 This document describes chemical loads.

77 This document is not intended to apply to environmental requirements or testing for systems and
78 components of motorcycles and mopeds. Electromagnetic compatibility (EMC) is not covered by this
79 document.

80 NOTE Conditions and testing for a continuous contact with chemical agents can be determined from other
81 standards or agreed upon between the customer and the supplier.

82 **2 Normative references**

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

86 ISO 16750-1, *Road vehicles — Environmental conditions and testing for electrical and electronic equipment*
87 — *Part 1: General*

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

90 **3 Terms and definitions**

91 For the purposes of this document, the terms and definitions given in ISO 16750-1 apply.

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

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

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

95 **4 Tests**

96 **4.1 General**

97 Components and associated parts that can come into contact with the specified chemical agents shall be
98 resistant to those agents. The components and associated parts shall be tested with all agents they are
99 likely to come into contact with, except for those materials which can be shown by documentary evidence
100 to be immune to the contaminant.

101 A material is considered to be immune to a contaminant if there is no change in properties sufficient to
102 affect material performances over the time and at the temperature specified in this clause.

103 The documentary evidence of immunity shall take into account effects of operating temperature and self-
104 heating if deemed necessary by agreement between the customer and the supplier.

105 The customer and the supplier shall agree on type of chemical agents and the manufacturer.

106 Resistance to the specified chemical agents shall be considered as early as possible during the material
107 selection process.

108 4.2 Purpose

109 The purpose of the test is to determine whether systems/components is unacceptably affected by
110 temporary exposure to contaminating agents.

111 NOTE This test is not intended to be a life test.

112 4.3 General test conditions

113 Chemical agents shall be selected as defined in Table 1, depending on the mounting location of the device
114 under test (DUT).

115 Unless otherwise specified, one DUT per test agent shall be used.

116 The following tests describe one test cycle. Unless otherwise specified, one test cycle with one agent per
117 DUT shall be performed. Any other number of cycles may be agreed between the customer and the
118 supplier.

119 During test cycle, the DUT shall be operating mode 1.2 as defined in ISO 16750-1.

120 NOTE1 Operating mode 1.1 with protection seals (e.g. sealed mating connector) can be applicable.

121 NOTE2 Operating mode with electrical operation can be used if agreed between the customer and the supplier,
122 and if judged feasible from test setup perspective.

123 NOTE 4 If the size of the DUT is sufficient, multiple test agents can be applied partially on one DUT provided that
124 these do not have any influence on each other.

125 NOTE 5 When only some part of the DUT (e.g. front panel part of audio) is exposed to chemicals, this test can be
126 performed with the applicable part by agreement between the customer and the supplier. Special considerations is
127 recommended to also be taken in this case to sealings, barriers, or other parts of the system that is actually
128 preventing the exposure of agents to the hidden parts of the DUT.

129 4.4 DUT conditioning

130 Unless otherwise specified, the DUT shall be stored at a room temperature (RT) of (23 ± 5) °C and a
131 relative humidity (RH) of between 25 % and 75 % until thermal equilibrium is reached.

132 The DUT shall be tested under conditions of normal use. If necessary, and unless otherwise specified,
133 unrepresentative coatings or contaminations of the DUT shall be removed.

134 If a cleaning procedure is needed, the customer and the supplier shall agree on the methodology.

135 4.5 Test agent conditioning

136 All test agents shall be stabilised at a RT of (23 ± 5) °C when applied on the DUT.

137 **4.6 Application method**

138 Unless otherwise specified, the application shall be performed at a RT of (23 ± 5) °C and a RH of between
139 25 % and 75 %.

140 The application method shall be such that the DUT is sufficiently wetted by the test agent in the areas to
141 be tested. The application method shall be chosen as defined in Table 2, depending on the agent and the
142 mounting location of the DUT.

143 The preferred application methods are given in Table 1.

144 **4.7 Test conditions**

145 Unless otherwise specified, the exposure of the DUT to the agent applied shall be performed at the
146 temperature and for the duration specified in Table 1.

147 **Table 1 — Chemical loads for equipment depending on the mounting location and test conditions**

ID	Chemical agent	Mounting location (code) ^a				Exposure conditions	
		Engine/electric motor compartment	Passenger compartment [B] ^b	Luggage compartment [C] ^b	Mounting on the exterior [D] ^b	Test temperature °C	Test duration
AA	Diesel fuel	I, III, IV, V	c	c	c	T _{max} ^d	22 h
AB	“Bio” diesel	I, III, IV, V	c	c	c	T _{max} ^d	22 h
AC	Petrol/gasoline unleaded	III, IV, V	c	c	c	RT	10 min
AD	Kerosene	c	c	II, III, IV, V	c	RT	10 min
AE	Methanol	II, III, IV, V, VI	c	c	c	RT	10 min
BA	Engine oil	II, III, IV, V	c	c	c	T _{max} ^d	22 h
BB	Differential oil	II, III, IV, V, VI	c	c	c	T _{max} ^d	22 h
BC	Transmission fluid	II, III, IV, V, VI	c	c	c	T _{max} ^d	22 h
BD	Hydraulic fluid	II, III, IV, V	c	c	c	T _{max} ^d	22 h
BE	Greases	II, III	c	c	c	T _{max} ^d	22 h
BF	Silicone oil	I, II, III, V	I, II, III, V	I, II, III, V	c	T _{max} ^d	22 h
CA	Battery fluid	III, V	III, V	III, V	c	RT	22 h
CB	Brake fluid	II, III, V	c	c	c	T _{max} ^d	22 h
CC	Antifreeze fluid	I, III, IV, V, VI	c	c	c	T _{max} ^d	22 h
CD	Urea NOx (reduction agent)	II, III, V	c	c	II, III, V	T _{max} ^d	22 h
CE	Cavity protection	c	c	c	II, III	RT	22 h
CF	Temporary protective lacquer / Transport wax	I, II	c	c	I, II	RT	22 h
CG	Temporary protective lacquer remover /	I, III, IV, V	c	c	I, III, IV, V	T _{max} ^d	22 h

	Transport wax remover						
DA	Windscreen washer fluid	II, III, IV, V	c	II, III, IV, V	II, III, IV, V	RT	2 h
DB	Vehicle washing chemicals	I, II, III, IV, V	c	c	I, II, III, IV, V	RT	2 h
DC	Interior cleaner	c	I, III	I, III	c	RT	2 h
DD	Glass cleaner	c	I, III	I, III	I, III	RT	2 h
DE	Wheel cleaner	c	c	c	I, II, III, IV	RT	2 h
DF	Cold cleaning agent	I, II, III, IV, V, VI	c	I, II, III, IV, V, VI	I, II, III, IV, V, VI	RT	22 h
DG	Acetone	c	I, II, III	c	c	RT	10 min
DH	Cleaning solvent white spirit	I, II, III	c	c	c	RT	10 min
DJ	Ammonium-containing cleaner	c	II, III, V	II, III, V	II, III, V	RT	22 h
DK	Denatured alcohol	I, II, III, IV, V	I, II, III, IV, V	I, II, III, IV, V	I, II, III, IV, V	RT	10 min
DL	Alkaline detergent	III, IV, V, VI	c	c	I, II, III, IV, V, VI	RT	22 h
EA	Contact spray	I, II, III	c	c	c	T_{max}^d	22 h
EB	Transpiration	c	II, III, V	c	c	RT	22 h
EC	Cosmetic product	c	II, III	II, III	c	RT	22 h
ED	Refreshment containing caffeine and sugar	c	III, IV	c	c	RT	22 h
EE	Runway de-icer	I, II, IV	c	c	I, II, IV	RT	2 h
EF	Dairy product	c	III, IV	c	c	RT	22 h
YY	Additional agents ^b	—	—	—	—	—	—

^a See Table 2 for the preferred application method of agents (I, II, III, IV, V and VI).

^b Depending on the mounting location, choose code A, B, C or D. Chemical loading can vary significantly depending on the type and use of the vehicle. For other requirements agreed between the customer and the supplier, choose code Z and mark all agents to be tested. Additional agents may be agreed between the customer and the supplier.

^c Chemical agents are not applied.

^d Test temperature: the maximum operating temperature, T_{max} , shall be in accordance with ISO 16750-4.

Table 2 — Application methods

Code	Method	Description of method
I	Spraying	—
II	Brushing	Apply the media on a soft brush and then brush the DUT with low force, brushing until DUT is wetted, media not dripping off.
III	Wiping	For example, wipe with media wetted but not dripping cotton cloth, wipe with light finger pressure; until DUT is wetted.

IV	Pouring	—
V	Dipping	Completely submerge the DUT for a very short time, i.e. brief immersion.
VI	Immersing	Completely submerge the DUT until no more air bubbles are emerging.

149 **4.8 Procedure**

150 The DUT shall be exposed to the agent (see Table 3) as defined in the application methods (see Table 2)
 151 at RT. The DUT shall then be stored in a suitable chamber at the temperature and for the duration
 152 specified in Table 1. If required, the DUT shall be cooled down to RT after storage and tested as specified
 153 below.

- 154 a) Perform a visual check and, if appropriate, a functional test and record data for comparison with
 155 post-test data.
- 156 b) Condition the DUT (see 4.4).
- 157 c) Place the DUT in its specified test setup. The configuration may include appropriate electrical or
 158 mechanical connections.
- 159 d) Stabilise the temperature of the specified agent(s) (see 4.5). Apply the specified agent(s) as defined
 160 in Table 1 and 4.6 to the surface of the DUT that is likely to be exposed.
- 161 e) Allow the DUT to drain naturally. Shaking or wiping is not permitted. However, if representative of
 162 service conditions, it may be turned about any axis to allow for drainage from different positions.
- 163 f) Maintain the DUT at the temperature and for the duration specified in Table 1.
- 164 g) Stabilise the DUT at RT.
- 165 h) For more than 1 cycle, repeat steps d) to g).
- 166 i) Examine the DUT immediately as defined in the requirements in 4.9.

167 Any safety and warning notes shall be observed.

168 NOTE Remaining agents can be wiped off before examination to avoid the influence of residual agents.

169 **4.9 Requirements**

170 The minimum functional status shall be class C as defined in ISO 16750-1. If necessary, other
 171 requirements shall be agreed between the customer and the supplier.

172 Marking and labelling shall remain visible and legible (e.g. High voltage caution labels).

173 **5 Documentation**

174 For documentation, Table 1 specifies the codes for chemical load and the designations outlined in
 175 ISO 16750-1 shall be used.

176 **Table 3 — Chemical agents**

Group	ID	Chemical agent	Description of active substance ^a
Fuels	AA	Diesel fuel	See EN 590
	AB	“Bio” diesel	See EN 14214