ISO 16750:2023

Vad är nytt i 2023-års utgåva?

Vad är ISO 16750?

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

- En av de vanligaste fordonsstandarderna för miljötålighetstestning
- Täcker elektriska och elektroniska system, inklusive elektriska drivlinor
- Inkluderar inte EMC
- Gäller ej för motorcyklar och mopeder

De olika delarna av ISO 16750

16750-1

Övergripande dokument som bl.a. beskriver följande:

- Klassificering utefter monteringsposition
- Driftslägen
- Funktionsstatus
- Generell testinformation

16750-2

Elbelastningar

16750-3

Mekaniska belastningar

16750-4

Klimatbelastingar

16750-5

Kemiska belastningar

RI.
SE

2023-års utgåva

2023–års utgåva innebar en kraftig uppdatering då standarden nu även omfattar elfordon

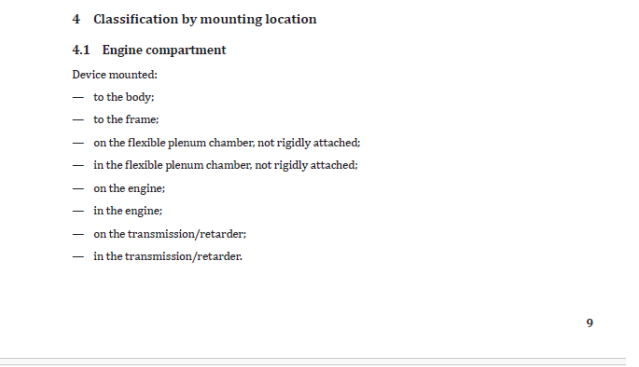
Även tester för bränsledrivna fordon har i många fall genomgått en väsentlig förändring

2023-års utgåva *ersätter* alla tidigare utgåvor som i.o.m. detta blir icke gällande

Exempel på förändringar

16750-1

Betydligt noggrannare uppdelning av monteringspositioner



4 Classification by mounting location

4.1 Engine compartment

Device mounted:

— to the body;
— to the frame;
— on the flexible plenum chamber, not rigidly attached;
— in the flexible plenum chamber, not rigidly attached;
— on the engine;
— in the engine;
— on the transmission/retarder;
— in the transmission/retarder.

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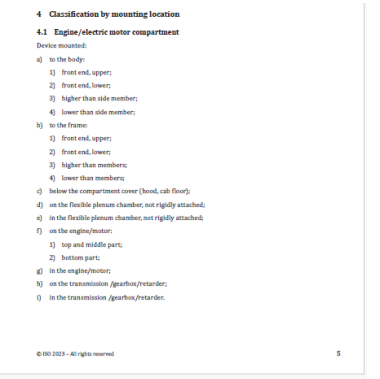

4 Classification by mounting location

4.1 Engine/electric motor compartment

Device mounted:

a) to the body:
   1) front end, upper;
   2) front end, lower;
   3) higher than side member;
   4) lower than side member;
b) to the frame:
   1) front end, upper;
   2) front end, lower;
   3) higher than members;
   4) lower than members;
c) below the compartment cover (hood, cab floor);
d) on the flexible plenum chamber, not rigidly attached;
e) in the flexible plenum chamber, not rigidly attached;
f) on the engine/motor:
   1) top and middle part;
   2) bottom part;
g) in the engine/motor;
h) on the transmission /gearbox/retarder;
i) in the transmission /gearbox/retarder.

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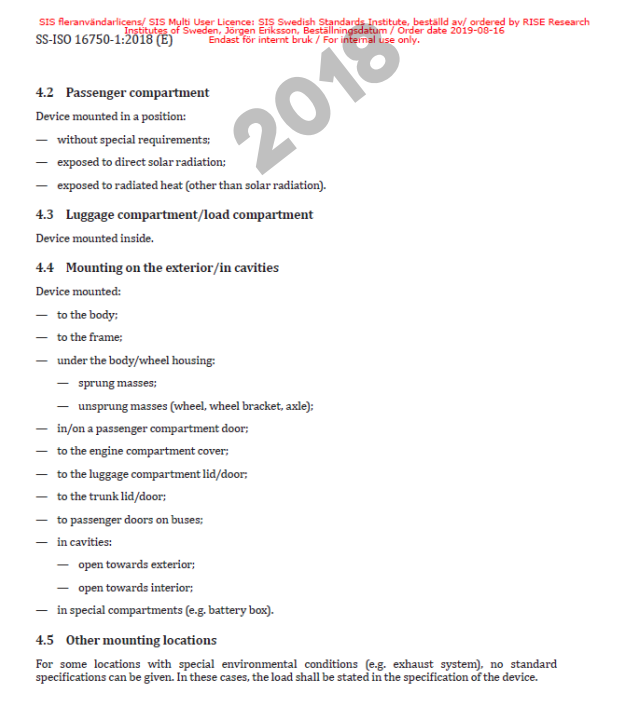

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2018

4.2 Passenger compartment

Device mounted in a position:

— without special requirements;
— exposed to direct solar radiation;
— exposed to radiated heat (other than solar radiation).

4.3 Luggage compartment/load compartment

Device mounted inside.

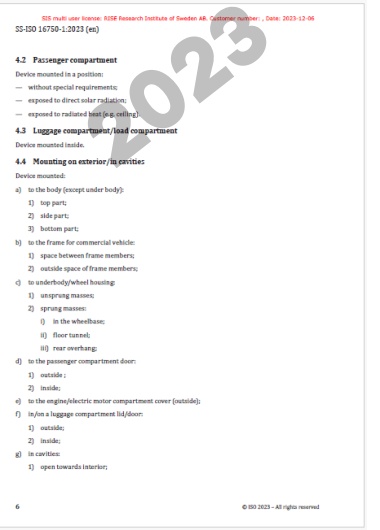
4.4 Mounting on the exterior/in cavities

Device mounted:

— to the body;
— to the frame;
— under the body/wheel housing:
  — sprung masses;
  — unsprung masses (wheel, wheel bracket, axle);
— in/on a passenger compartment door;
— to the engine compartment cover;
— to the luggage compartment lid/door;
— to the trunk lid/door;
— to passenger doors on buses;
— in cavities:
  — open towards exterior;
  — open towards interior;
— in special compartments (e.g. battery box).

4.5 Other mounting locations

For some locations with special environmental conditions (e.g. exhaust system), no standard specifications can be given. In these cases, the load shall be stated in the specification of the device.



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2023

4.2 Passenger compartment

Device mounted in a position:

— without special requirements;
— exposed to direct solar radiation;
— exposed to radiated heat (e.g. ceiling).

4.3 Luggage compartment/load compartment

Device mounted inside.

4.4 Mounting on exterior/in cavities

Device mounted:

a) to the body (except under body):
   1) top part;
   2) side part;
   3) bottom part;
b) to the frame for commercial vehicle:
   1) space between frame members;
   2) outside space of frame members;
c) to underbody/wheel housing:
   1) unsprung masses;
   2) sprung masses:
      i) in the wheelbase;
      ii) floor tunnel;
      iii) rear overhang;
d) to the passenger compartment door:
   1) outside ;
   2) inside;
e) to the engine/electric motor compartment cover (outside);
f) in/on a luggage compartment lid/door:
   1) outside;
   2) inside;
g) in cavities:
   1) open towards interior;

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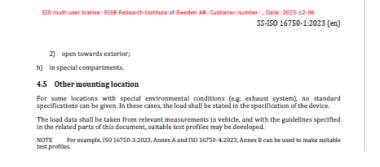

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   2) open towards exterior;
h) in special compartments.

4.5 Other mounting location

For some locations with special environmental conditions (e.g. exhaust system), no standard specifications can be given. In these cases, the load shall be stated in the specification of the device.

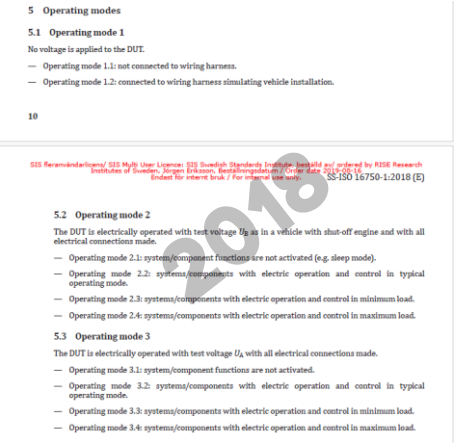
The load data shall be taken from relevant measurements in vehicle, and with the guidelines specified in the related parts of this document, suitable test profiles may be developed.

NOTE For example, ISO 16750-3:2023, Annex A and ISO 16750-4:2023, Annex B can be used to make suitable test profiles.

Exempel på förändringar

16750-1

Fler driftslägen



5 Operating modes

5.1 Operating mode 1

No voltage is applied to the DUT.

— Operating mode 1.1: not connected to wiring harness.

— Operating mode 1.2: connected to wiring harness simulating vehicle installation.

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5.2 Operating mode 2

The DUT is electrically operated with test voltage U_B as in a vehicle with shut-off engine and with all electrical connections made.

— Operating mode 2.1: system/component functions are not activated (e.g. sleep mode).

— Operating mode 2.2: systems/components with electric operation and control in typical operating mode.

— Operating mode 2.3: systems/components with electric operation and control in minimum load.

— Operating mode 2.4: systems/components with electric operation and control in maximum load.

5.3 Operating mode 3

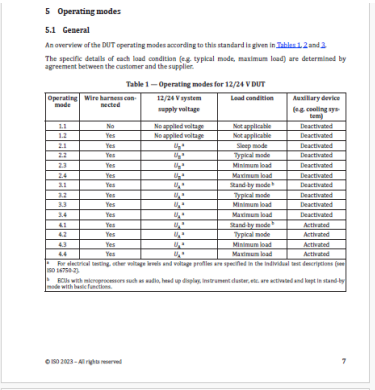
The DUT is electrically operated with test voltage U_A with all electrical connections made.

— Operating mode 3.1: system/component functions are not activated.

— Operating mode 3.2: systems/components with electric operation and control in typical operating mode.

— Operating mode 3.3: systems/components with electric operation and control in minimum load.

— Operating mode 3.4: systems/components with electric operation and control in maximum load.



5 Operating modes

5.1 General

An overview of the DUT operating modes according to this standard is given in Tables 1, 2 and 3.

The specific details of each load condition (e.g. typical mode, maximum load) are determined by agreement between the customer and the supplier.

Table 1 — Operating modes for 12/24 V DUT

Operating mode	Wire harness connected	12/24 V system supply voltage	Load condition	Auxiliary device (e.g. cooling system)
1.1	No	No applied voltage	Not applicable	Deactivated
1.2	Yes	No applied voltage	Not applicable	Deactivated
2.1	Yes	U_B [a]	Sleep mode	Deactivated
2.2	Yes	U_B [a]	Typical mode	Deactivated
2.3	Yes	U_B [a]	Minimum load	Deactivated
2.4	Yes	U_B [a]	Maximum load	Deactivated
3.1	Yes	U_A [a]	Stand-by mode [b]	Deactivated
3.2	Yes	U_A [a]	Typical mode	Deactivated
3.3	Yes	U_A [a]	Minimum load	Deactivated
3.4	Yes	U_A [a]	Maximum load	Deactivated
4.1	Yes	U_A [a]	Stand-by mode [b]	Activated
4.2	Yes	U_A [a]	Typical mode	Activated
4.3	Yes	U_A [a]	Minimum load	Activated
4.4	Yes	U_A [a]	Maximum load	Activated

[a] For electrical testing, other voltage levels and voltage profiles are specified in the individual test descriptions (see ISO 16750-2).

[b] ECUs with microprocessors such as audio, head up display, instrument cluster, etc. are activated and kept in stand-by mode with basic functions.

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Table 2 — Operating modes for 48 V DUT (with 12/24 V circuits)

Operating mode	Wire harness connected	12/24 V system supply voltage	48 V System supply voltage	Load condition	Auxiliary device (e.g. cooling system)
1.1	No	No applied voltage	No applied voltage	Not applicable	Deactivated
1.2	Yes	No applied voltage	No applied voltage	Not applicable	Deactivated
2.1	Yes	U_B [a]	No applied voltage	Sleep mode	Deactivated
2.2	Yes	U_B [a]	No applied voltage	Typical mode	Deactivated
2.3	Yes	U_B [a]	No applied voltage	Minimum load	Deactivated
2.4	Yes	U_B [a]	No applied voltage	Maximum load	Deactivated
3.1	Yes	U_A [a]	U_{48S}	Stand-by mode [b]	Deactivated
3.2	Yes	U_A [a]	U_{48S}	Typical mode	Deactivated
3.3	Yes	U_A [a]	U_{48S}	Minimum load	Deactivated
3.4	Yes	U_A [a]	U_{48S}	Maximum load	Deactivated
4.1	Yes	U_A [a]	U_{48S}	Stand-by mode [b]	Activated
4.2	Yes	U_A [a]	U_{48S}	Typical mode	Activated
4.3	Yes	U_A [a]	U_{48S}	Minimum load	Activated
4.4	Yes	U_A [a]	U_{48S}	Maximum load	Activated

[a] For electrical testing, other voltage levels and voltage profiles are specified in the individual test descriptions (see ISO 16750-2).

[b] ECUs with microprocessors such as audio, head up display, instrument cluster, etc. are activated and kept in stand-by mode with basic functions.

NOTE Operating mode 3.X and 4.X correspond to operating mode 2.X as defined in ISO 21780.

Table 3 — Operating modes for voltage class B DUT (with 12/24 V circuits)

Operating mode	Wire harness connected	12/24 V system supply voltage	Class B circuit supply voltage	Load condition	Auxiliary device (e.g. cooling system)
1.1	No	No applied voltage	No applied voltage [c]	Not applicable	Deactivated
1.2	Yes	No applied voltage	No applied voltage [c]	Not applicable	Deactivated
2.1	Yes	U_B [a]	No applied voltage [c]	Sleep mode	Deactivated
2.2	Yes	U_B [a]	No applied voltage [c]	Typical mode	Deactivated
2.3	Yes	U_B [a]	No applied voltage [c]	Minimum load	Deactivated
2.4	Yes	U_B [a]	No applied voltage [c]	Maximum load	Deactivated

[a] For electrical testing, other voltage levels and voltage profiles are specified in the individual test descriptions (see ISO 16750-2).

[b] ECUs with microprocessors such as audio, head up display, instrument cluster, etc. are activated and kept in stand-by mode with basic functions.

[c] For voltage class B circuit, no applied voltage normally means the contactor is open.

Table 3 (continued)

Operating mode	Wire harness connected	12/24 V system supply voltage	Class B circuit supply voltage	Load condition	Auxiliary device (e.g. cooling system)
3.1	Yes	U_A [a]	U_X	Stand-by mode [b]	Deactivated
3.2	Yes	U_A [a]	U_X	Typical mode	Deactivated
3.3	Yes	U_A [a]	U_X	Minimum load	Deactivated
3.4	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
4.1	Yes	U_A [a]	U_X	Stand-by mode [b]	Activated
4.2	Yes	U_A [a]	U_X	Typical mode	Activated
4.3	Yes	U_A [a]	U_X	Minimum load	Activated
4.4	Yes	U_A [a]	U_X	Maximum load	Activated

[a] For electrical testing, other voltage levels and voltage profiles are specified in the individual test descriptions (see ISO 16750-2).

[b] ECUs with microprocessors such as audio, head up display, instrument cluster, etc. are activated and kept in stand-by mode with basic functions.

[c] For voltage class B circuit, no applied voltage normally means the contactor is open.

5.2 Operating mode 1

No voltage is applied to the DUT.

— Operating mode 1.1: not connected to wiring harness.

— Operating mode 1.2: connected to wiring harness simulating vehicle installation.

5.3 Operating mode 2

The DUT is electrically operated with a test voltage U_B as in a vehicle with shut-off combustion engine, high voltage battery and/or DC-DC converter disconnected, and all electrical connections made. For specific test cases, other test voltages or other voltage profiles can apply.

— Operating mode 2.1: systems/components functions are not activated (e.g. sleep mode).

— Operating mode 2.2: systems/components with electric operation and control in typical operating mode.

— Operating mode 2.3: systems/components with electric operation and control in minimum load.

— Operating mode 2.4: systems/components with electric operation and control in maximum load.

5.4 Operating mode 3

The DUT is electrically operated with test voltages U_A and U_X with all electrical connections made. However, an auxiliary machine (e.g. cooling system) is not installed.

For all voltage systems, operating mode 3.4 can be changed to 3.2 by agreement between the customer and the supplier to avoid overheating of the DUT or unfeasible test setup.

In the case of the DUT having 48 V circuits and not having the circuits of voltage class B, apply U_{48S} instead of U_X. In case of the DUT having only 12/24 V circuits, supply only the voltage of 12/24 V. For specific test cases, other test voltages or other voltage profiles can apply.

— Operating mode 3.1: systems/components functions are not activated.

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— Operating mode 3.2: systems/components with electric operation and control in typical operating mode.

— Operating mode 3.3: systems/components with electric operation and control in minimum load.

— Operating mode 3.4: systems/components with electric operation and control in maximum load.

NOTE 1 Operating mode 3.4 is not applied to voltage class B components and systems.

NOTE 2 The operating mode for the DUT with 48 V circuits load corresponds to operating mode 2 as defined in ISO 21780.

5.5 Operating mode 4

The DUT is electrically operated with test voltages U_A and U_X with all electrical connections made. Also an auxiliary machine (e.g. cooling system) is installed. Operating modes (minimum, typical, maximum) shall be agreed between the customer and the supplier. Operating mode 4.4 can be changed to 4.2 by agreement between the customer and the supplier to avoid overheating of the DUT or unfeasible test setup.

In the case of the DUT having 48 V circuits and not having the circuits of voltage class B, apply U_{48S} instead of U_X. In case of the DUT having only 12/24 V circuits, supply only the voltage of 12/24 V. For specific test cases, other test voltages or other voltage profiles can apply.

— Operating mode 4.1: systems/components functions are not activated.

— Operating mode 4.2: systems/components with electric operation and control in typical operating mode.

— Operating mode 4.3: systems/components with electric operation and control in minimum load.

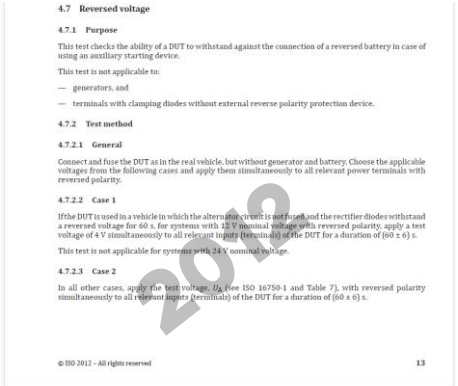
— Operating mode 4.4: systems/components with electric operation and control in maximum load.

NOTE The operating mode for the DUT with 48 V circuits load corresponds to operating mode 2 as defined in ISO 21780.

Exempel på förändringar

16750-2

Förtydligande av testförfarande



4.7 Reversed voltage

4.7.1 Purpose

This test checks the ability of a DUT to withstand against the connection of a reversed battery in case of using an auxiliary starting device.

This test is not applicable to:

— generators, and

— terminals with clamping diodes without external reverse polarity protection device.

4.7.2 Test method

4.7.2.1 General

Connect and fuse the DUT as in the real vehicle, but without generator and battery. Choose the applicable voltages from the following cases and apply them simultaneously to all relevant power terminals with reversed polarity.

4.7.2.2 Case 1

If the DUT is used in a vehicle in which the alternator circuit is not fused and the rectifier diodes withstand a reversed voltage for 60 s, for systems with 12 V nominal voltage with reversed polarity, apply a test voltage of 4 V simultaneously to all relevant inputs (terminals) of the DUT for a duration of (60 ± 6) s.

This test is not applicable for systems with 24 V nominal voltage.

4.7.2.3 Case 2

In all other cases, apply the test voltage, U_R (see ISO 16750-1 and Table 7), with reversed polarity simultaneously to all relevant inputs (terminals) of the DUT for a duration of (60 ± 6) s.

2012

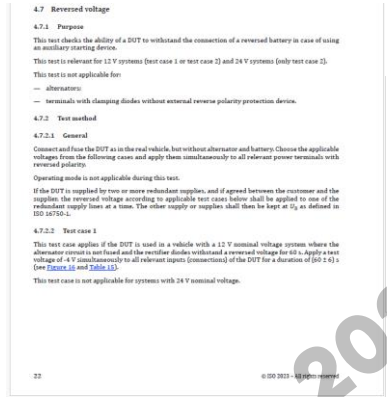
ISO 16750-2:2012(E)

Table 7 — Test voltage

Nominal voltage, U_N V	Test voltage, U_R V
12	14
24	28

4.7.3 Requirement

After replacing all blown fuse-links, the functional status shall be class A as defined in ISO 16750-1.



4.7 Reversed voltage

4.7.1 Purpose

This test checks the ability of a DUT to withstand the connection of a reversed battery in case of using an auxiliary starting device.

This test is relevant for 12 V systems (test case 1 or test case 2) and 24 V systems (only test case 2).

This test is not applicable for:

— alternators;

— terminals with clamping diodes without external reverse polarity protection device.

4.7.2 Test method

4.7.2.1 General

Connect and fuse the DUT as in the real vehicle, but without alternator and battery. Choose the applicable voltages from the following cases and apply them simultaneously to all relevant power terminals with reversed polarity.

Operating mode is not applicable during this test.

If the DUT is supplied by two or more redundant supplies, and if agreed between the customer and the supplier, the reversed voltage according to applicable test cases below shall be applied to one of the redundant supply lines at a time. The other supply or supplies shall then be kept at U_N as defined in ISO 16750-1.

4.7.2.2 Test case 1

This test case applies if the DUT is used in a vehicle with a 12 V nominal voltage system where the alternator circuit is not fused and the rectifier diodes withstand a reversed voltage for 60 s. Apply a test voltage of -4 V simultaneously to all relevant inputs (connections) of the DUT for a duration of (60 ± 6) s (see Figure 16 and Table 15).

This test case is not applicable for systems with 24 V nominal voltage.

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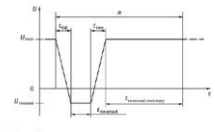

Key

t	time, in seconds
U	test voltage, in volts
$U_{reversed}$	reversed test voltage, in volts
U_{Smin}	minimum supply voltage, in volts
n	number of reversed voltage events in sequence
t_{fall}	fall time, in seconds
$t_{reversed}$	reversed voltage duration, in seconds
t_{rise}	rise time, in seconds
$t_{reversed\,recovery}$	recovery between reversed voltage events, in seconds

Figure 16 — Reversed voltage test case 1

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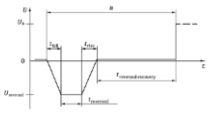


Key

t	time, in seconds
U	test voltage, in volts
$U_{reversed}$	reversed test voltage, in volts
U_N	supply voltage, in volts
n	number of reversed voltage events in sequence
t_{fall}	fall time, in seconds
$t_{reversed}$	reversed voltage duration, in seconds
t_{rise}	rise time, in seconds
$t_{reversed\,recovery}$	recovery between reversed voltage events, in seconds

Figure 17 — Reversed voltage test case 2

Table 15 — Reversed voltage test case 1 values

Parameter	t_{fall}	t_{rise}	$t_{reversed}$	$t_{reversed\,recovery\,min}$	U_{Smin}	$U_{reversed}$	n
12 V system	≤ 10 ms	≤ 10 ms	60 s	120 s	10.5 V	-4 V	1

4.7.2.3 Test case 2

In all other cases, apply the test voltage $U_{reversed}$ (see Figure 17 and Table 16) simultaneously to all relevant inputs (connections) of the DUT for a duration of (60 ± 6) s.

Table 16 — Reversed voltage test case 2 values

Parameter	t_{fall}	t_{rise}	$t_{reversed}$	$t_{reversed\,recovery}$	U_N	$U_{reversed}$	n
12 V system	≤ 10 ms	≤ 1 000 ms	60 s	120 s	12 V	-14 V	1
24 V system	≤ 10 ms	≤ 1 000 ms	60 s	120 s	24 V	-26 V	1

4.7.3 Requirements

After replacing all blown fuse-links, functional status class A as defined in ISO 16750-1 is required during active operating modes.

Exempel på förändringar

16750-3

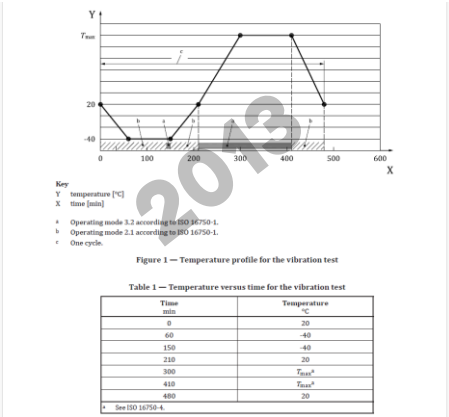
- Provföremål delas upp utefter vikt (under resp. över 2 kg)
- Definierat att vid efterpåföljande test *ska* samma provföremål användas (gäller vissa test)
- Fallproven *ska* utföras utan förpackning

Exempel på förändringar

16750-3

`Vibration`

Flera olika temperaturprofiler för vibrationsprovning



Key
Y temperature [°C]
X time [min]

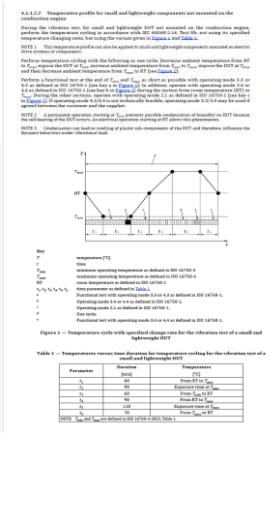
a Operating mode 3.2 according to ISO 16750-1.
b Operating mode 2.1 according to ISO 16750-1.
c One cycle.

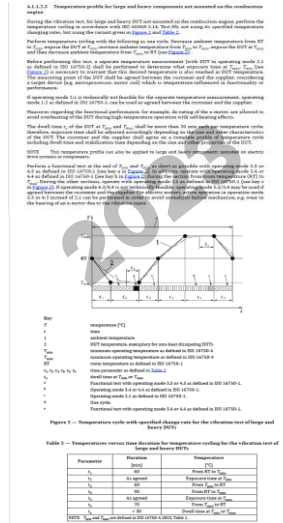
Figure 1 — Temperature profile for the vibration test

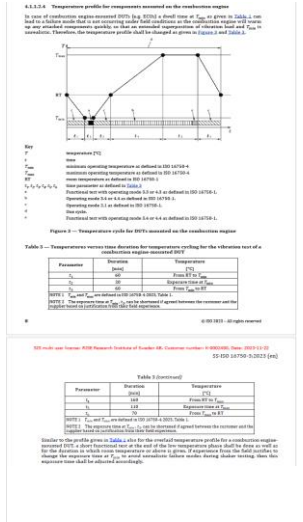
Table 1 — Temperature versus time for the vibration test

Time min	Temperature °C
0	20
60	-40
150	-40
210	20
300	T_{test}[a]
410	T_{test}[a]
480	20

[a] See ISO 16750-4.





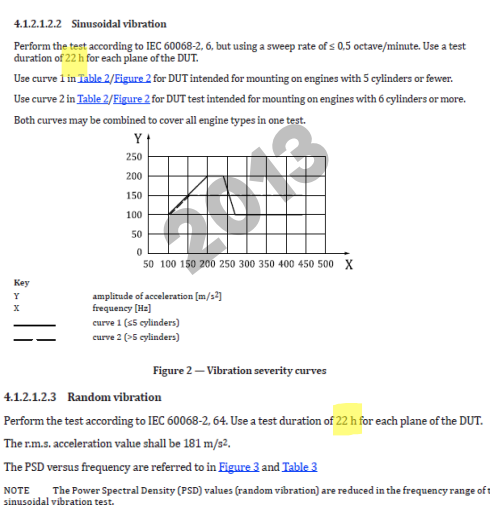


Exempel på förändringar

16750-3

`Vibration`

- Testprofiler har tillkommit
- Testprofiler har uppdaterats med avseende både på strängheter och varaktighet



4.1.2.1.2.2 Sinusoidal vibration

Perform the test according to IEC 60068-2, 6, but using a sweep rate of ≤ 0.5 octave/minute. Use a test duration of 22 h for each plane of the DUT.

Use curve 1 in Table 2/Figure 2 for DUT intended for mounting on engines with 5 cylinders or fewer.

Use curve 2 in Table 2/Figure 2 for DUT test intended for mounting on engines with 6 cylinders or more.

Both curves may be combined to cover all engine types in one test.

Key
Y amplitude of acceleration [m/s²]
X frequency [Hz]
curve 1 (≤5 cylinders)
curve 2 (>5 cylinders)

Figure 2 — Vibration severity curves

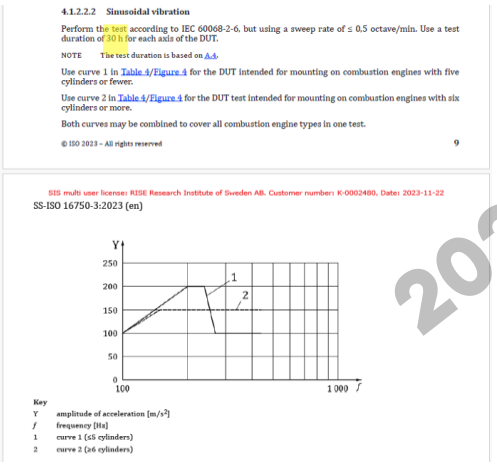
4.1.2.1.2.3 Random vibration

Perform the test according to IEC 60068-2, 64. Use a test duration of 22 h for each plane of the DUT.

The r.m.s. acceleration value shall be 181 m/s².

The PSD versus frequency are referred to in Figure 3 and Table 3

NOTE The Power Spectral Density (PSD) values (random vibration) are reduced in the frequency range of the sinusoidal vibration test.



4.1.2.2.2 Sinusoidal vibration

Perform the test according to IEC 60068-2-6, but using a sweep rate of ≤ 0.5 octave/min. Use a test duration of 30 h for each axis of the DUT.

NOTE The test duration is based on A.4.

Use curve 1 in Table 4/Figure 4 for the DUT intended for mounting on combustion engines with five cylinders or fewer.

Use curve 2 in Table 4/Figure 4 for the DUT test intended for mounting on combustion engines with six cylinders or more.

Both curves may be combined to cover all combustion engine types in one test.

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Key
Y amplitude of acceleration [m/s²]
f frequency [Hz]
1 curve 1 (≤5 cylinders)
2 curve 2 (≥6 cylinders)

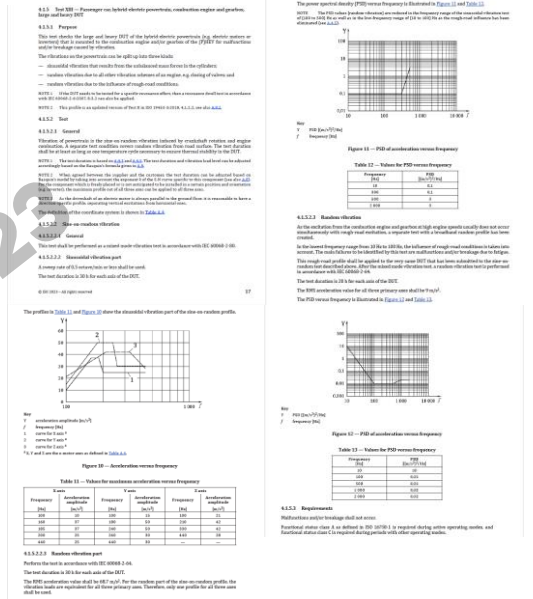
4.1.2.2.3 Random vibration

Perform the test according to IEC 60068-2-64. Use a test duration of 30 h for each axis of the DUT.

The root mean square (RMS) acceleration value shall be 181 m/s².

Values for power spectral density (PSD) versus frequency are referred to in Figure 5 and Table 5.

NOTE The PSD values (random vibration) are reduced in the frequency range of the sinusoidal vibration test.



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Exempel på förändringar

16750-3

Shock

- Fler kategorier
- Ändrat antal shockpulser

Table 24 — Number of shocks

	Shock profile 1	Shock profile 2
	500 m/s²; 11 ms	300 m/s²; 6 ms
Driver's door, cargo door	13 000	100 000
Passenger's doors	6 000	50 000
Trunk lid, tailgate	2 400	30 000
Engine hood	720	3 000

2013

Table 36 — Number of shocks on passenger cars

	Shock profile A	Shock profile B
Max. shock amplitude	500 m/s²	300 m/s²
Shock duration	11 ms	6 ms
Driver's door, cargo door	24 000	184 000
Passenger's doors	11 000	92 000
Trunk lid, tailgate	4 400	55 000
Combustion engine/e-motor hood	1 320	5 500
Electric vehicle front trunk for charging equipment	580	2 400

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Exempel på förändringar

16750-4

Omfånget för driftstemperaturer har utökats

4 Operating temperature ranges

The applicable operating temperature ranges shall be chosen from Table 1 and shall be given in the specification of the device under test (DUT).

Table 1 — Operating temperature ranges

Code	Minimum operating temperature T_{min} °C	Maximum operating temperature T_{max} °C
A	–20	65
B	–30	65
C	–40	65
D		70
E		75
F		80
G		85
H		90
I		95
J		100
K		105
L		110
M		115
N		120
O		125
P		130
Q		140
R		150
S		155
T		160
Z	as agreed upon	

2010

Table 1 — Operating temperature ranges

Code	Minimum operating temperature T_{min} [°C]	Maximum operating temperature T_{max} [°C]
A	–20	65
B	–30	65

Table 1 *(continued)*

Code	Minimum operating temperature T_{min} [°C]	Maximum operating temperature T_{max} [°C]
C	–40	65
D		70
E		75
F		80
G		85
H		90
I		95
J		100
K		105
L		110
M		115
N		120
O		125
P		130
Q		140
R		150
S		155
T		160
U		165
V		170
W		175
X		180
Z	As agreed	

2023

Table 2 — Relative temperature increase in hot soak

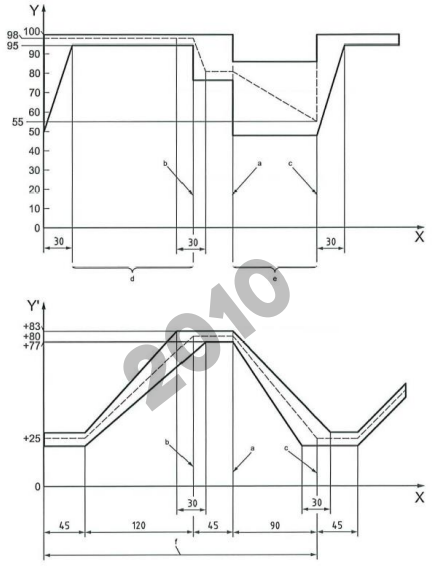
Code	ΔT_{HS} [°C]
a	15
b	30
c	50
z	As agreed

NOTE For DUTs with hot soak, the code letter is defined as a combination of Tables 1 and 2, e.g. Hb (T_{max} = 90 °C and ΔT_{HS} = 30 °C).

Exempel på förändringar

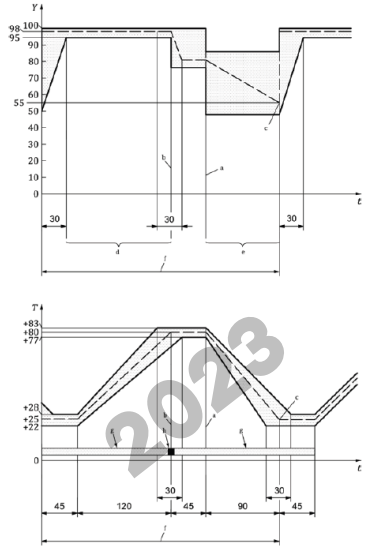
16750-4

Driftslägen under provning har förtydligats



Key
X time, in min
Y relative humidity, in % RH
Y' temperature, in °C
a Start of temperature fall.
b End of temperature rise.
c Recommended set value humidity/temperature.
d Condensation.
e Drying.
f One cycle.

Figure 8 — Dewing test cycle



Key
t time, in min
Y relative humidity, in %
T temperature, in °C
a Start of temperature fall.
b End of temperature rise.

c Recommended set value for humidity/temperature.
d Condensation.
e Drying.
f One cycle.
g Operating mode 2.1 as defined in ISO 16750-1.
h Functional test with operating mode 3.3 as defined in ISO 16750-1.

Exempel på förändringar

16750-5

Förtydligande av appliceringsmetod

4.6 Application method

Unless otherwise specified, application shall be performed at an RT of (23 ± 5) °C and an RH of between 45 % and 75 %.

It shall be ensured by the choice of the application method that the DUT is sufficiently wetted by the test agent in the areas to be tested. The application method shall be chosen in accordance with Table 2, depending on the agent and the mounting location of the DUT.

The preferred application methods are given in Table 1.

2010

4.6 Application method

The application method shall be such that the DUT is sufficiently wetted by the chemical agent in the areas to be tested. Possible application methods are listed in Table 1 as code I to VI. Refer to 4.7 for the preferred application method (see also Table 2).

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

2023

Table 1 — Application methods

Code	Method	Description of method
I	Spraying	Spray the chemical agent using for instance a spray bottle. Spray until DUT is wetted, agent not dripping off.
II	Brushing	Apply the chemical agent on a soft brush and then brush the DUT with low force, brushing until DUT is wetted, agent not dripping off.
III	Wiping	For example, wipe with chemical agent wetted but not dripping cotton cloth, wipe with light finger pressure. Wipe until DUT is wetted, agent not dripping off.
IV	Pouring	Sprinkle the chemical agent over the DUT using for instance a funnel or dropper. Sprinkle until DUT is wetted, agent not dripping off.
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.

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