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Road vehicles — Electrical and electronic equipment for a supply voltage of 42 V — Electrical loads

Véhicules routiers — Équipement électrique et électronique pour une tension d'alimentation de 42 V — Contraintes électriques

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 21848 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 3, *Electrical and electronic equipment*.

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Road vehicles — Electrical and electronic equipment for a supply voltage of 42 V — Electrical loads

1 Scope

This International Standard describes the electrical loads that can affect electric and electronic systems and components of road vehicles for a supply voltage of 42 V, which may be used in a single or a multiple voltage electrical system.

In addition, it specifies the tests and resulting requirements, test equipment accuracy being agreed upon between the vehicle manufacturer and the supplier. It does not cover electromagnetic compatability (EMC).

NOTE Electrical loads are independent from the mounting location.

This International Standard also provides design guidance for the interaction of 42 V with other system voltages.

2 Normative references

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The following referenced documents are indispensable for the application 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.

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ISO 7637-2, *Road Vehicles — Electrical disturbances by conduction and coupling — Part 2: Electrical transient conduction along supply lines only*

ISO 16750-1:2003, *Road vehicles — Environmental conditions and testing for electrical and electronic equipment — Part 1: General*

ISO 16750-2:2003, *Road vehicles — Environmental conditions and testing for electrical and electronic equipment — Part 2: Electrical loads*

ISO 16750-4:2003, *Road vehicles — Environmental conditions and testing for electrical and electronic equipment — Part 4: Climatic loads*

UL[1)] 94, *Standard for Test for Flammability of Plastic Materials for Parts in Devices and Appliances*

3 Terms and definitions

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

3.1
U_{high}
upper limit of the normal d.c. supply voltage range

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3.2
U_{low}
lower limit of the normal d.c. supply voltage range

3.3
$U_{max,dyn}$
maximum dynamic overvoltage associated with generator load dump transient protection

3.4
U_T
voltage applied during testing under defined conditions and which may be static voltage or transient

3.5
U_S
minimum permissible dynamic undervoltage associated with the starting pulse

3.6
U_A
minimum permissible steady-state voltage during cranking of the combustion engine including a possible ripple

4 Supply voltage

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4.1 Direct current

4.1.1 Purpose

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This test verifies the device under test (DUT) functionality in the range between minimum and maximum supply voltage.

4.1.2 Test

Set the supply voltage in accordance with Table 1 to all relevant inputs (connections) of the DUT.

Measure all voltages at the relevant terminals of the DUT.

The voltages given in Table 1 are relevant within the operating temperature range according to ISO 16750-4:2003, Table 1, without time limits.

Table 1 — Supply voltage for U_N = 42 V system devices

Code	Supply voltage V	
	U_{low}	U_{high}
L	30	48

4.1.3 Requirement

All DUT functions shall remain Class A as defined in ISO 16750-1:2003, Clause 6.

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4.2 Overvoltages

4.2.1 Maximum continuous voltage

Under all conditions the maximum continuous supply voltage for the DUT shall not exceed U_{high} according to Table 1.

4.2.2 Maximum dynamic voltage

4.2.2.1 Immunity

Except for 4.2.2.1.1 to 4.2.2.1.3 below, immunity to voltage transients shall be in accordance with ISO 7637-2:2004.

4.2.2.1.1 Purpose

This test verifies functionality of the DUT when subjected to the maximum dynamic voltage, $U_{max,dyn}$. It simulates the maximum dynamic voltage for high-energy pulses in a 42 V vehicle electrical system, caused by load dump, and is the upper voltage limit for load dump protection.

4.2.2.1.2 Test

Apply one test pulse to the DUT according to Figure 1.

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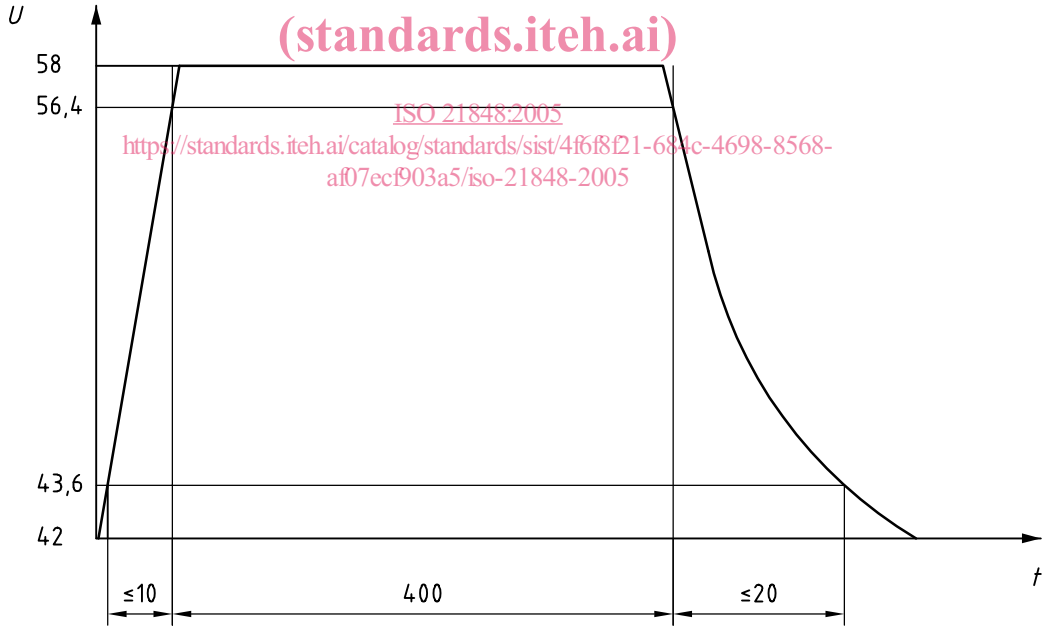

Key

t time, ms

U voltage, V

Figure 1 — Test pulse for $U_{max,dyn}$

The internal resistance R_i of the load dump test pulse generator shall be (100 to 500) mΩ.

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4.2.2.1.3 Requirement

The functional status shall be minimum Class D according to ISO 16750-1:2003, Clause 6. Special requirements may be agreed between vehicle manufacturer and supplier.

4.2.2.2 Emission

No electrical and electronic equipment shall produce a voltage on the network exceeding 50 V except the generator during load dump and pulses as specified by ISO 7637-2.

Except for 4.2.2.1.1 to 4.2.2.1.3, measures shall be taken to ensure that 50 V is never exceeded (e.g. protection devices at the source and/or adjustment of generator voltage).

4.3 Superimposed alternating voltage

4.3.1 Purpose

This test simulates a.c. on the d.c. supply.

The DUT is checked for undesirable resonance modes and induced thermal stress.

4.3.2 Test

Connect the DUT as shown in Figure 2. Perform the test, in accordance with Table 2 and Figure 2, simultaneously on all applicable inputs (connections) of the DUT.

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NOTE Do not apply these test voltages to the battery.

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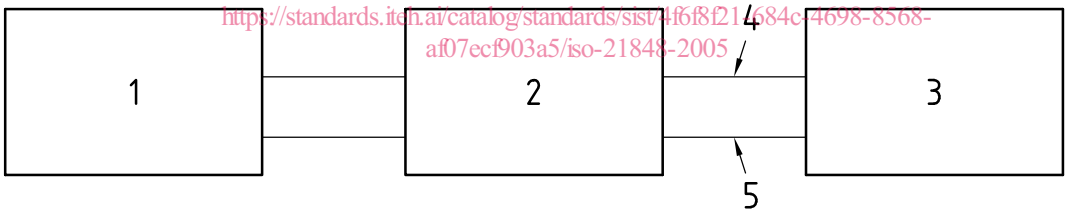

Figure 2 — Test set-up for superimposing a.c. voltage on component power supply lines

Table 2 — Test values

Test voltage (see Figure 3)	U_{dc} + 0,5 U_{PP} sin(ωt)
a.c. voltage (sinusoidal)	a) U_{dc} = 48 V; U_{PP} = 4 V for 50 Hz to 1 kHz b) U_{dc} = 48 V; U_{PP} = 1 V for 1 kHz to 20 kHz c) U_{dc} = 32 V; U_{PP} = 4 V for 50 Hz to 1 kHz d) U_{dc} = 32 V; U_{PP} = 1 V for 1 kHz to 20 kHz
Internal resistance of power supply	50 mΩ to 100 mΩ
Frequency range	See Figure 4
Type of frequency sweep	See Figure 4
Sweep duration (one sweep) (see Figure 4)	120 s
Number of continuous sweeps per test	5

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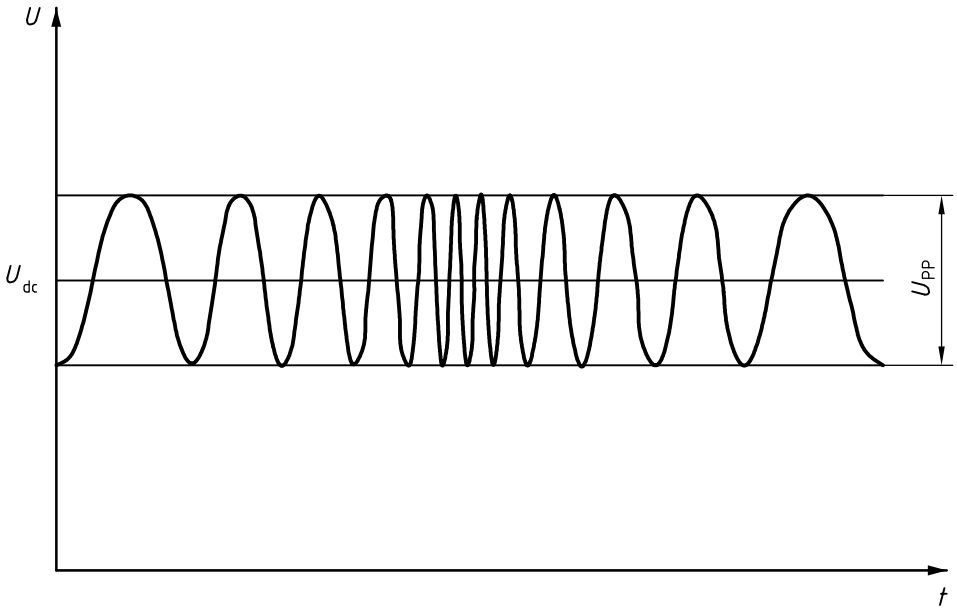
4.3.3 Requirement

The functional status shall be Class A according to ISO 16750-1:2003, Clause 6.



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Key

U voltage, V

t time, s

Figure 3 — Test voltage with superimposed sinusoidal a.c. voltage

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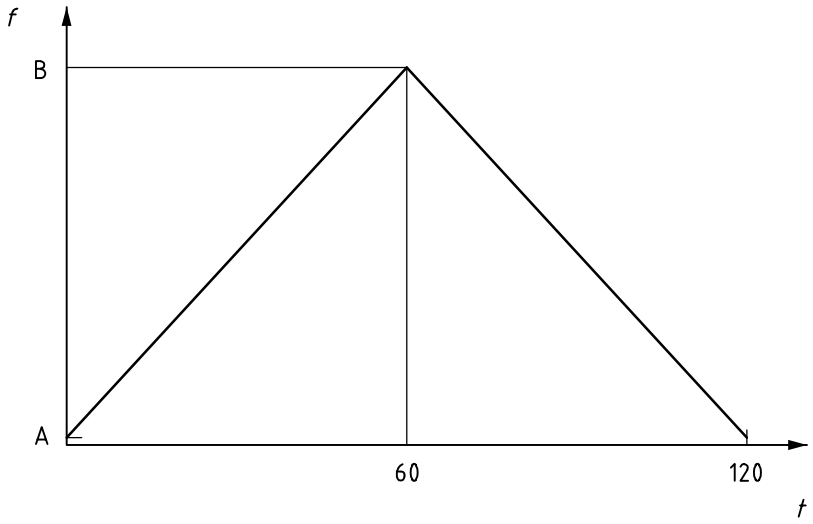

Key

f frequency, Hz logarithmic scale

t time, s

A 50 Hz [Table 2, a) and c)] or 1 kHz [Table 2, b) and d)]

B 1 kHz [Table 2, a) and c)] or 20 kHz [Table 2, b) and d)]

Figure 4 — Frequency sweep

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