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

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Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of Economy, Trade and Industry, through deliberations at the Japanese Industrial Standards Committee as the result of proposal of establishing a Japanese Industrial Standard submitted by Society of Automotive Engineers of Japan, Inc. (JSAE) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law.

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

Introduction

This Japanese Industrial Standard has been prepared based on the first edition of **ISO 21848** published in 2005 with some modifications of the technical contents in order to make the specification clearer.

The portions underlined with dots are the matters in which the contents of the corresponding International Standard have been modified. A list of modifications with explanations is given in Annex JA.

1 Scope

This 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 and specifies the tests and resulting requirements.

The accuracy of test equipment shall be as agreed upon between the vehicle manufacturer and the supplier (hereafter referred to as “interested parties”).

This Standard does not cover electromagnetic compatibility (EMC).

NOTE 1 Electrical loads are independent from the mounting location.

NOTE 2 This Standard also provides design guidance for the interaction of 42 V with other system voltages.

NOTE 3 The International Standard corresponding to this Standard and the symbol of degree of correspondence are as follows.

ISO 21848: 2005 *Road vehicles—Electrical and electronic equipment for a supply voltage of 42 V—Electrical loads* (MOD)

The symbols which denote the degree of correspondence between **JIS** and the relevant International Standard are IDT (identical), MOD (modified) or NEQ (not equivalent) according to **ISO/IEC Guide 21**.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. For the standards with the indication of year, the edition of the indicated year shall be applied and not any revisions made thereafter (including amendments). For those with no indication of year, the most recent edition (including amendments) shall be applied.

ISO 7637-2 *Road vehicles—Electrical disturbances from 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 16750-4:2003 *Road vehicles—Environmental conditions and testing for electrical and electronic equipment—Part 4: Climatic loads*

3 Terms and definitions

For the purposes of this Standard, the terms and definitions given in the following shall apply.

3.1 maximum supply voltage, U_{high}

upper limit of the normal d.c. supply voltage range

3.2 minimum supply voltage, U_{low}

lower limit of the normal d.c. supply voltage range

3.3 maximum dynamic overvoltage, $U_{\text{max,dyn}}$

maximum dynamic overvoltage associated with generator load dump transient protection

3.4 test voltage, U_{T}

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

3.5 minimum starting voltage, U_{S}

minimum permissible dynamic undervoltage associated with the starting pulse

3.6 steady-state starting voltage, U_{A}

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

3.7 nominal voltage, U_{N}

nominal voltage of electrical systems used in road vehicles

3.8 d.c. applied voltage, U_{dc}

basic d.c. voltage in a.c.-superimposed supply voltage

3.9 peak-to-peak voltage, U_{pp}

peak-to-peak voltage in an a.c. waveform superimposed on d.c.

4 Tests and requirements

4.0A General

The following tolerances shall be applied to the measurement items unless otherwise specified:

- voltage: $\pm 0.2 \text{ V}$;
- frequency and time: $\pm 5 \%$;
- resistance: $\pm 10 \%$.

4.1 Direct current

4.1.1 Purpose

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 $U_N = 42\text{ V}$ 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.

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**.

4.2.2.1.1 Purpose

This test verifies functionality of the DUT when subjected to the maximum dynamic voltage, $U_{\text{max,dyn}}$. It simulates the maximum dynamic overvoltage 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.

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

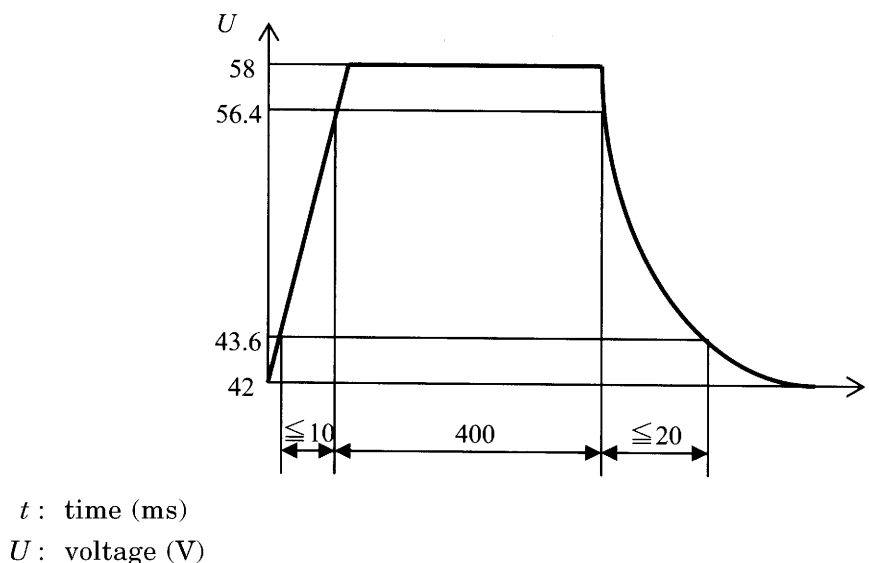


Figure 1 Test voltage for $U_{\max, \text{dyn}}$

4.2.2.1.3 Requirement

The functional status shall be minimum Class C according to **ISO 16750-1:2003**, clause 6. Special requirements may be agreed between the manufacturer and the 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 to check the functional status of the DUT.

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.

Do not apply these test voltages to the battery.