



SLOVENSKI STANDARD
SIST HD 591 S1:1998
01-november-1998

Stacionarna transformatorja v sistemih za vleko

Stationary transformers in traction systems

Stationäre Transformatoren in Bahnstromversorgungssystemen

Transformateurs de sous-stations de traction

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Ta slovenski standard je istoveten z: **HD 591 S1:1998**

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ICS:

29.180	Transformatorji. Dušilke	Transformers. Reactors
29.280	Ò\ dã } æ } æ] ^ { æ	Electric traction equipment

SIST HD 591 S1:1998 **en**

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HARMONIZATION DOCUMENT
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English version

Stationary transformers in traction systemsTransformateurs de sous-stations
de tractionStationäre Transformatoren in
Bahnstromversorgungssystemen

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This Harmonization Document was approved by CENELEC on 9 March 1993. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for implementation of this Harmonization Document on a national level.

Up-to-date lists and bibliographical references concerning national implementation may be obtained on application to the Central Secretariat or to any CENELEC member.

This Harmonization Document exists in three official versions (English, French, German).

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

This Harmonization Document was prepared by the Joint Working Group "Stationary traction transformers" of CENELEC Technical Committees SC 9XC, Electric supply and earthing systems for public transport equipment and ancillary apparatus (fixed installations), and TC 14, Power transformers.

The draft was submitted to the Unique Acceptance Procedure (UAP) and approved by CENELEC as HD 591 S1 on 1993-03-09.

The following dates were fixed:

- latest date of announcement
of the HD at national level (doa) 1993-09-01
- latest date of publication of
a harmonized national standard (dop) 1994-03-01
- latest date of withdrawal of
conflicting national standards (dow) 1994-03-01


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1 General

1.1 Scope

This document covers specific characteristics of stationary transformers for the supply of power to a.c. and d.c. traction systems.

NOTE 1: Transformers feeding a.c. contact lines are covered by IEC 76, endorsed as HD 398, but require a few particular prescriptions.

NOTE 2: Transformers feeding d.c. contact lines through static convertors are covered by IEC 146, but require some additional or modified prescriptions.

NOTE 3: Transformers mounted on-board of traction vehicles are covered by IEC 310 and are excluded.

1.2 Normative references

This Harmonization Document incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this Harmonization Document only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

1.2.1 The references to the following documents are normative:

HD 398		Power transformers ¹⁾ (IEC 76)
HD 398.1 S1	1980	Part 1: General (IEC 76-1:1976, modified)
HD 398.2 S1	1980	Part 2: Temperature rise
A1	1988	(IEC 76-2:1976, modified)
HD 398.3 S1	1986	Part 3: Insulation levels and dielectric tests (IEC 76-3:1980 + A1:1981, modified)
HD 398.5 S1	1983	Part 5: Ability to withstand short circuit
A1	1988	(IEC 76-5:1976 + A1:1979, modified)
HD 464 S1	1988	Dry-type power transformers
A2	1991	(IEC 726:1982 + A1:1986, modified)
IEC 146	series	Semiconductor convertors

1.2.2 Additional useful information may be found in the following IEC Guides:

IEC 354	1991	Loading guide for oil-immersed power transformers
IEC 905	1987	Loading guide for dry-type power transformers

1) In case of new editions of IEC 76 and subsequent endorsement by CENELEC, the present document will be amended. Pending such amendment, the equivalent clauses of the new IEC 76 publications (and relevant HD) shall be taken as reference.

1.3 Loading

1.3.1 General

A load cycle is a repetitive variation of loads with the time.

The transformers under this document are normally dimensioned from the load cycle specified by the purchaser.

Alternatively, the purchaser may specify the equivalent rating of the transformer from his own analysis of the expected load cycle.

Should the situation arise where a purchaser is unable or unwilling to perform analysis of expected load cycles, subclause 1.3.3 concerning simplified load cycles may be referred to.

1.3.2 Equivalent rated current of a load cycle

The rated current of the transformer I_r shall be selected and specified not less than the quadratic mean of the load current I over the load cycle:

$$I_r = \sqrt{1/T \int_T I^2 dt}$$

where T = current duration.

During any period of 6 consecutive hours the load current shall not stay continuously above rated current for more than two hours at a time. Otherwise, details of the prospective load cycle should be submitted for consideration in the enquiry, and the rated current selected according to detailed analysis of the cycle.

Basing on the fact that harmonic currents may be present in the system, the same shall be taken into account in assessing the required rating of the transformer.

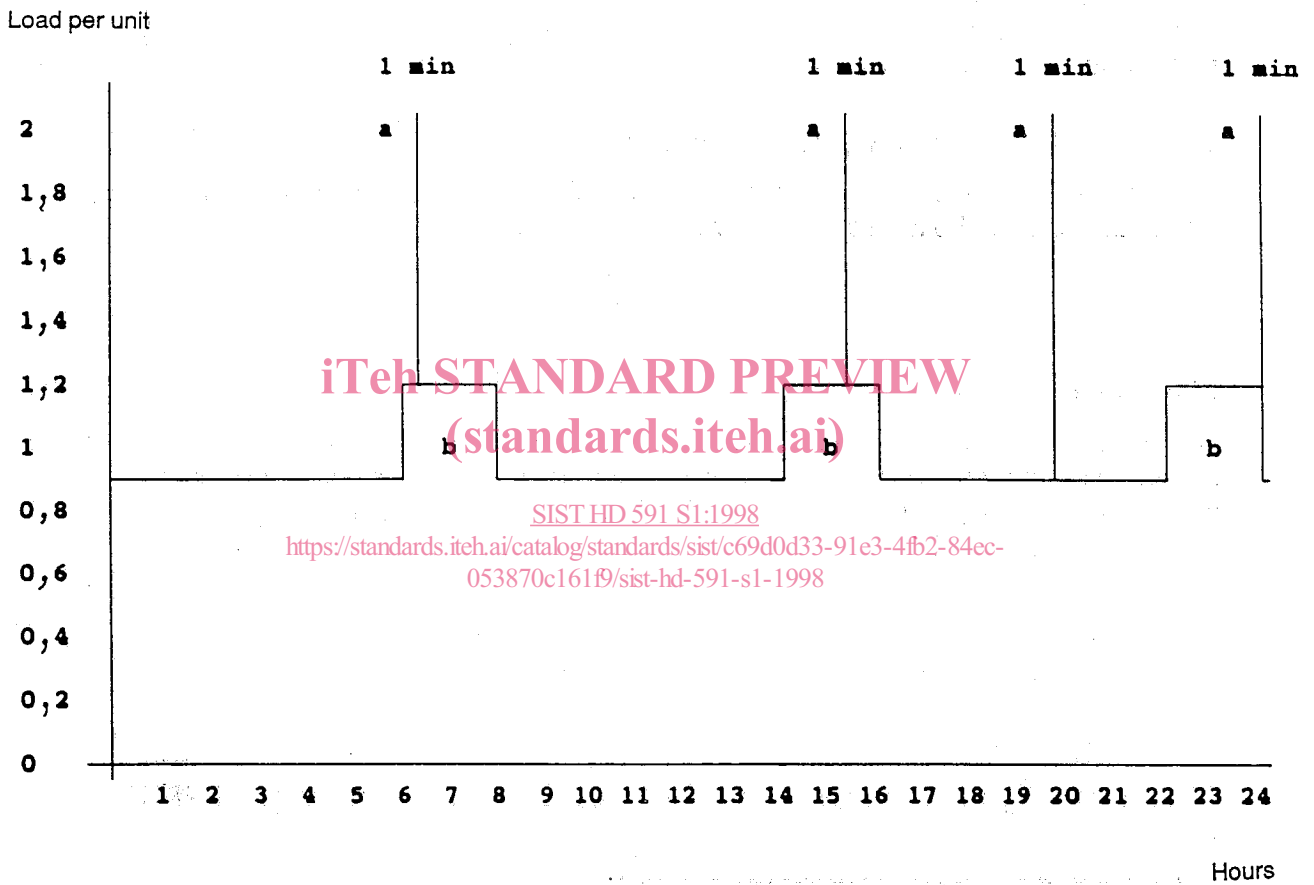
NOTE: Attention should be paid to thermal effects of the short-time peak loads.

1.3.3 Typical load cycles

The following figures 1 to 4 give a series of typical load cycles applicable to the traction use.

In the same it has been assumed what follows:

- The basic rms value of the load cycle is the rated current for which the transformer is dimensioned.
- Short-time and long-time peak loads are described.
- Long-time loading conditions have the durations and the time sequence indicated in the figure.
- Short-time peak-loads may occur when the transformer is in any loading condition. The time between two short-time peaks shall have a duration of at least five times the peak-load duration. The short-time peak-load cycle shall be specified by the purchaser at the time of enquiry and order.



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a = short-time peak load (2,0 per unit)
 b = long-time peak load (1,2 per unit)

Figure 1: Load cycle

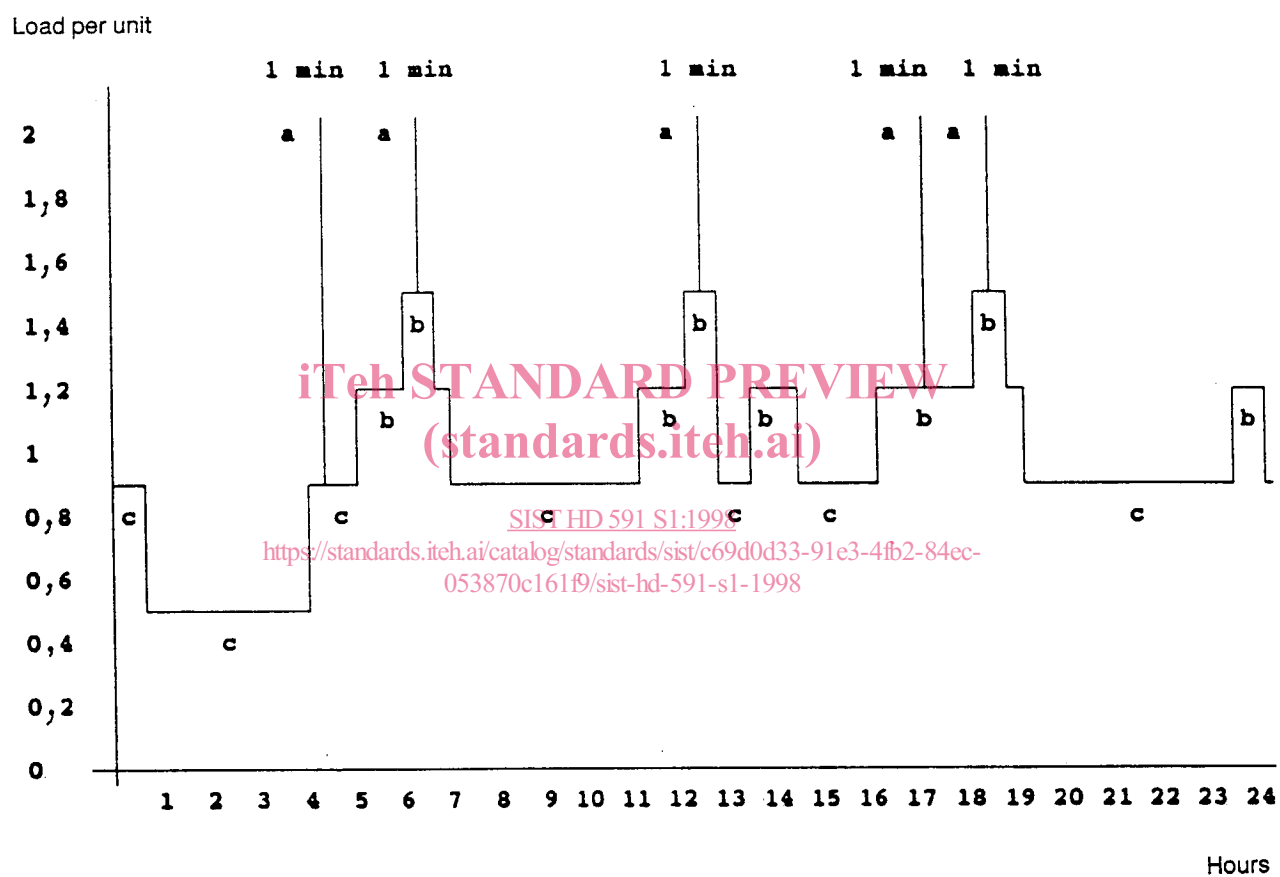
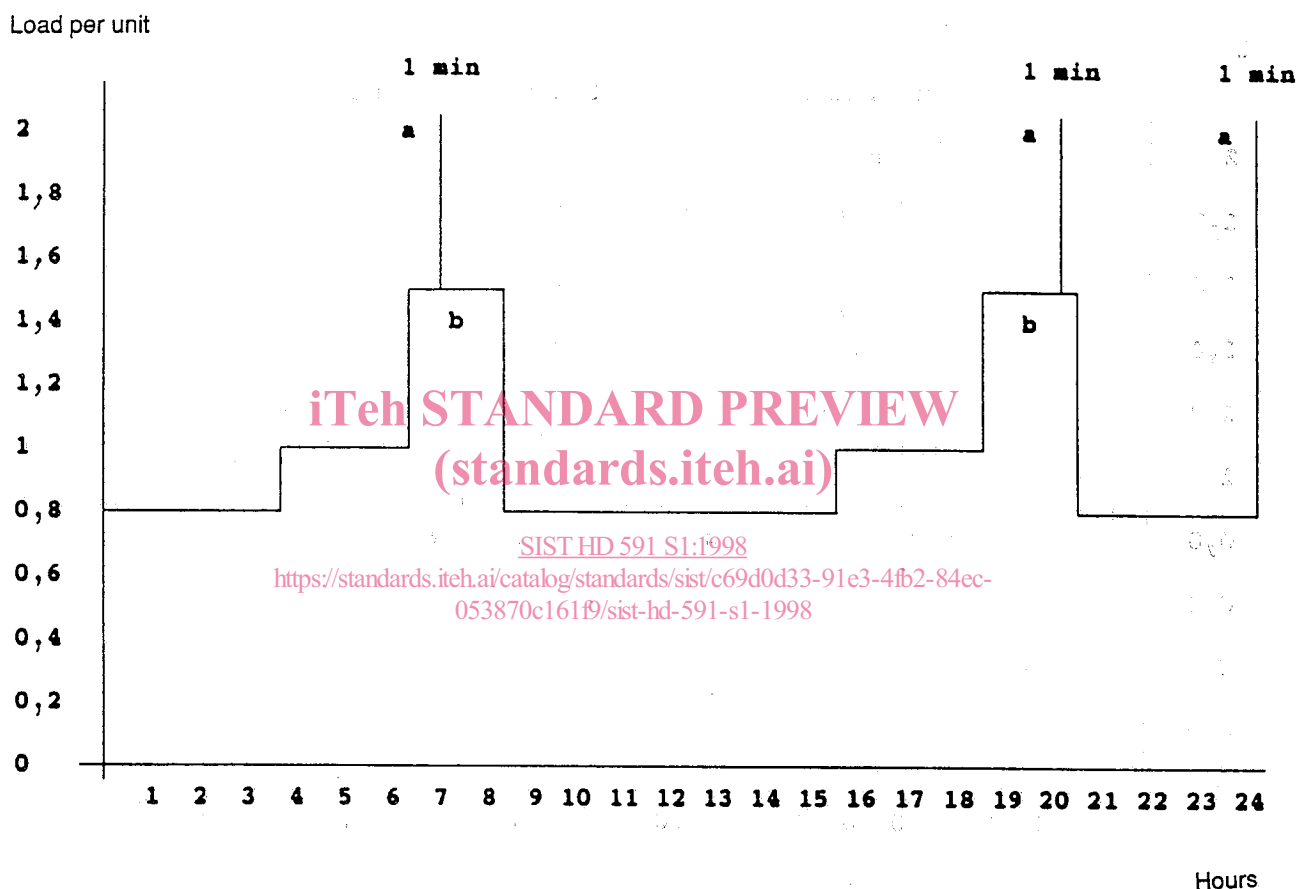
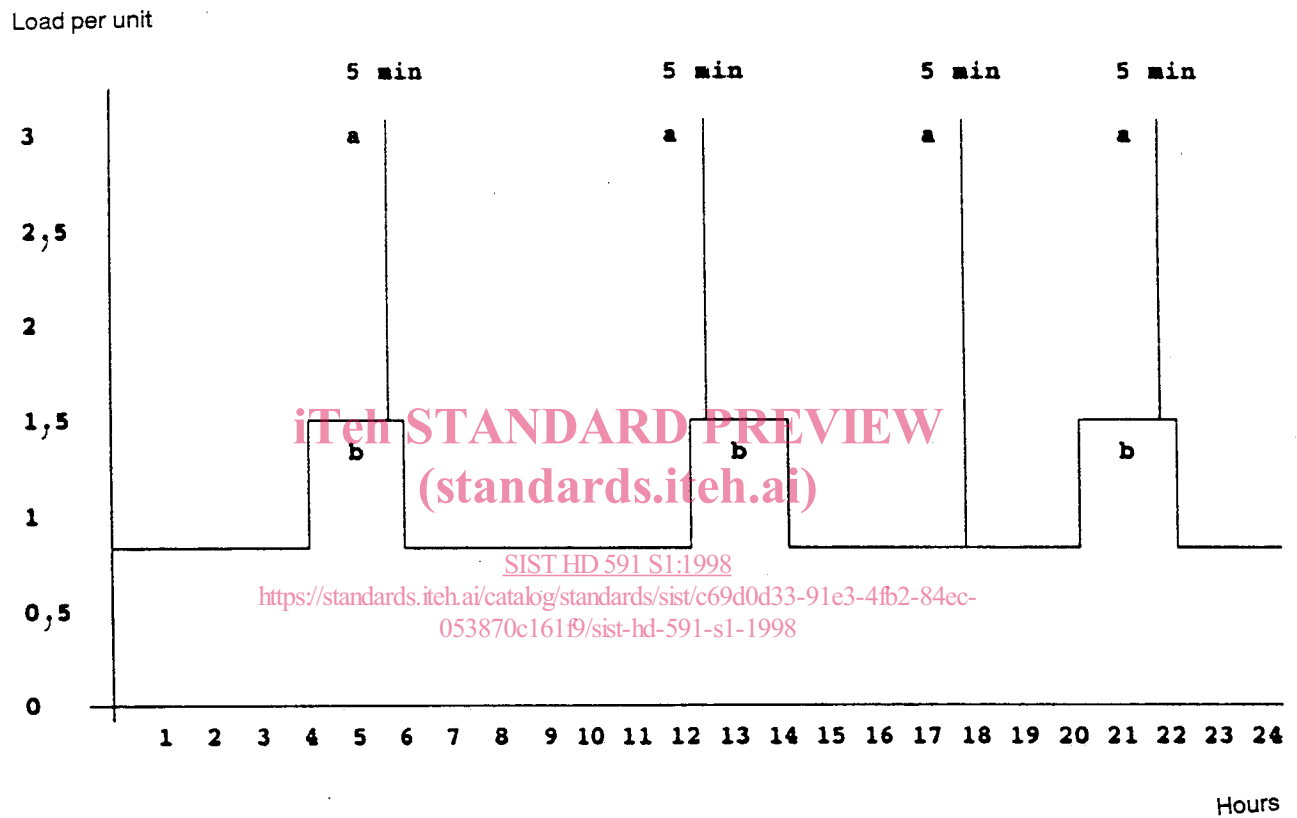


Figure 2: Load cycle



a = short-time peak load (2,0 per unit)
 b = long-time peak load (1,5 per unit)

Figure 3: Load cycle



a = short-time peak load (3,0 per unit)
b = long-time peak load (1,5 per unit)

Figure 4: Load cycle