SLOVENSKI STANDARD

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Railway applications - Insulation coordination - Part 1: Basic requirements; Clearances and creepage distances for all electrical and electronic equipment - Amendment A1

ICS 29.080.01; 29.280

Referenčna številka
SIST EN 50124-1:2002/A1:2004(en)

EUROPEAN STANDARD **EN 50124-1/A1**

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English version

Railway applications - Insulation coordination Part 1: Basic requirements - Clearances and creepage distances for all electrical and electronic equipment

Applications ferroviaires - Coordination de l'isolement Partie 1: Prescriptions fondamentales - Distances d'isolement dans l'air et lignes de fuite pour tout matériel électrique et électronique

Bahnanwendungen - Isolationskoordination Teil 1: Grundlegende Anforderungen - Luft- und Kriechstrecken für alle elektrischen und elektronischen Betriebsmittel

This amendment A1 modifies the European Standard EN 50124-1:2001; it was approved by CENELEC on 2003-10-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment the status of a national standard without any alteration.

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

This amendment exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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

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Foreword

This amendment to the European Standard EN 50124-1:2001 was prepared by the Technical Committee CENELEC TC 9X, Electrical and electronic applications for railways.

The text of the draft was submitted to the formal vote and was approved by CENELEC as amendment A1 to EN 50124-1:2001 on 2003-10-01.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2004-10-01

- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2006-10-01

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given for information only.
In this standard, Annexes A, B, C and D are normative and Annexes E, F and G are informative.

Annex F (informative) **Bibliography**

Add the following documents:

EN 50123 series	Railway applications - Fixed installations - D.C. switchgear
EN 50152 series	Railway applications - Fixed installations - Particular requirements for a.c. switchgear
EN 50153	Railway applications - Rolling stock - Protective provisions relating to electrical hazards
EN 61558 series	Safety of power transformers, power supply units and similar devices

Add the following annex:

Annex G
(informative)

Application guide

G.1 Introduction

The term "insulation co-ordination" explains the process for co-ordinating the constituents of an electrical insulation, i.e. solid/liquid insulation, clearances and creepage distances.

NOTE The dimensioning of insulation thicknesses performed by solid insulation and insulation distances performed by liquid insulation materials is not covered by this standard.

However, the use of this standard for the determination of clearances and creepages needs some additional explanations: The values of the tables of Annex A are based on EN 60664-1 and EN 60071-1 taking into account the severe electrical and mechanical situation of insulations in railway systems and their expected reliability and long life time.

For example, the values for clearances are selected for inhomogeneous fields and, for locations with typical railway pollutions are supplemented by safety margins. Thus, it is not necessary to perform a high voltage test, when clearances required by this standard are achieved.

Where product standards for railway applications specify test voltages and clearances, the use of these values is recommended. According to 1.1 it can be assumed that the insulation values in the product standards were derived in accordance with this European Standard.

G.2 Determination of minimum clearances and creepage distances

G.2.1 Sections

For practical use when determining insulation values it is necessary to consider the following factors when dividing into sections:

– is the considered part of the circuit exposed to the same electrical climate? (working voltage, overvoltage category);

– are the location criteria of the regarded part of circuit the same? (pollution degree, indoors/outdoors);

– for economical reasons it may be useful to subdivide sections (e.g. for lower insulation values in areas with lower voltage stress);

– for reliability or safety reasons it may be useful to increase insulation values in endangered areas, i.e. by introducing a separate section.

For floating sections consideration should be given to capacitive effects for defining the dimensioning parameters of an insulation. Due to the actual or parasitic capacitances between the regarded section and adjacent sections, creepage and clearances can be stressed by continuous voltages greater than the nominal voltage of the circuit. The correct selection of U_{Nm} and U_{Ni} should take that effect into account.

G.2.2 Use of method 1 and 2 for determining U_{Ni}

Methods 1 and 2 are considered as equivalent for dimensioning clearances because both methods lead to reliable distances.

Method 2 is a physical method to determine an insulation value taking into account the voltage stress occurring across the regarded insulation but it can only be used if the expected overvoltages are well known.

If the overvoltages are not known, method 1 should be used.

G.2.3 How to determine minimum clearances and creepage distances

The flowchart of Figure G.1 displays the procedure for determining the minimum clearances and creepage distances by taking into account the relevant electrical, environmental and operating conditions.

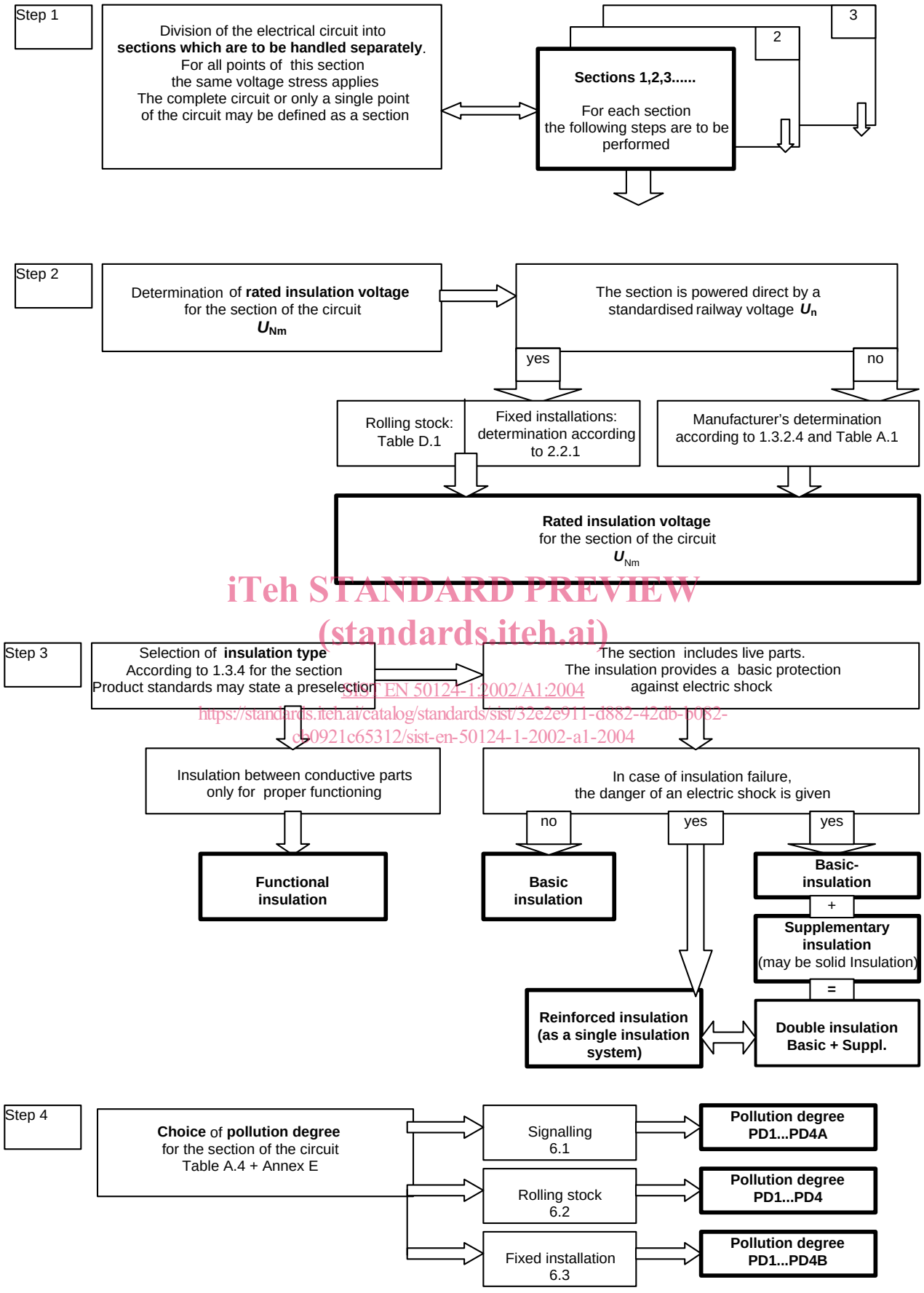

Figure G.1 – Determination of minimum clearances and creepage distances

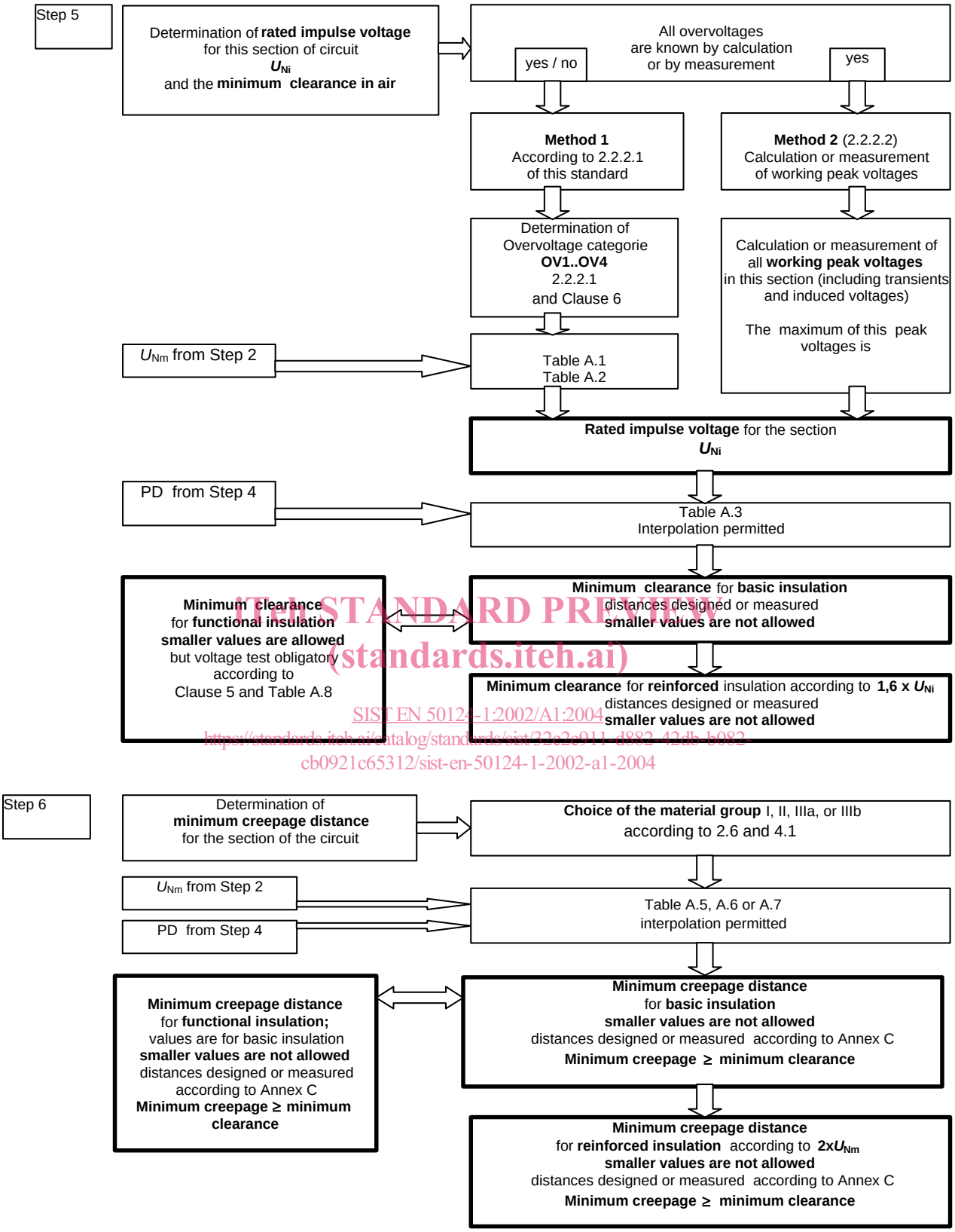

Figure G.1 – Determination of minimum clearances and creepage distances (concluded)

G.2.4 Pollution

Table A.4 and Annex E may be used to identify the pollution degree applicable. A definition of a pollution degree with numerical values is not practicable.

There is no direct relation between the protection level given by IP classes of EN 60529 and the pollution to be expected. The IP classes are related to the protection against the ingress of solid objects including dust and against the ingress of water (e. g. spraying, splashing, water jets, immersion, etc.). Protection according to IP classes cannot prevent pollution created by the equipment itself.

The pollution degree PD1 may be used in areas of fixed installations and of signalling equipment where the temperature and the humidity are permanently controlled. These conditions are normally not given in rolling stock.

Table A.3 shows that for indoor locations (PD1 to PD3A) the pollution has no additional influence on clearances above 1,6 mm. On the contrary, for PD4 in rolling stock outdoor installations and for PD4A and PD4B in fixed installations, the pollution has a significant influence on clearances throughout the whole voltage range. Therefore these clearances are derived from the size of solid particles and the accumulation of pollutants likely to reduce the clearances.

For outdoor fixed installations special conditions (PD4A and PD4B) apply. It is because the pollution at any particular area is always present for that particular area and may be very severe. Rolling stock may operate in areas where the levels will be different and then the average level of pollution and time of application should be considered. Also fixed installations may be cleaned less frequently.

For further guidance in selecting PD4A and PD4B the following, which is based on IEC 60815, should be noted:

PD4A "heavy conditions"

– Areas with high density of industries and suburbs of large cities with high density of heating plants producing pollution;

– Areas close to the sea or in any area exposed to relatively strong winds from the sea.

PD4B "very heavy conditions"

– Areas generally of moderate extent, subjected to conductive dusts and to industrial smoke producing particular thick conductive deposits;

– Areas generally of moderate extent, very close to the coast and exposed to sea spray or to very strong and polluting winds from the sea;

– Desert areas, characterised by no rain for long periods, exposed to strong winds carrying sand and salt, and subjected to regular condensation.