

English version

**Guide for the application
of the European Standard EN 50160**

This Technical Report was approved by CENELEC on 2003-11-01.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Lithuania, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, 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 Technical Report has been prepared by BTTF 68-6 and finalized by CENELEC TC 8X/WG1 based on an application guide written by the former UNIPEDE Group of Experts NORMCOMP: "Electricity Product Characteristics and Electromagnetic Compatibility"[1].

The text of the draft was submitted to the formal vote and was approved by CENELEC as CLC/TR 50422 on 2003-11-01.

The contents of the corrigendum of June 2005 have been included in this copy.

This document is a preview generated by EVS

Contents

	Page
1 Background	4
1.1 General.....	4
1.2 Background of the definition of supply voltage characteristics.....	4
2 Application of the European Standard EN 50160	5
2.1 Introduction.....	5
2.2 Scope of the European Standard.....	5
2.3 Definitions.....	8
2.4 Groups of voltage characteristics.....	9
2.4.1 Definite values.....	10
2.4.2 Indicative values.....	10
2.5 Voltage terminology.....	11
3 Description of main voltage characteristics	11
3.1 Power frequency.....	11
3.2 Magnitude of the supply voltage	12
3.3 Supply voltage variations	12
3.4 Rapid voltage changes	13
3.4.1 Magnitude of rapid voltage changes.....	13
3.4.2 Flicker severity	13
3.4.3 Supply voltage dips	14
3.5 Short and long interruptions of the supply voltage.....	16
3.6 Temporary (power frequency) overvoltages between live conductors and earth	17
3.6.1 LV distribution systems	18
3.6.2 MV distribution systems	18
3.7 Transient overvoltages between live conductors and earth.....	19
3.7.1 LV distribution system	19
3.7.2 MV distribution systems	20
3.8 Supply voltage unbalance.....	21
3.9 Harmonic voltage.....	22
3.10 Interharmonic voltage	23
3.11 Mains signalling voltage on the supply voltage	23
4 References	24

1 Background

1.1 General

This guide has been prepared by BTTF 68-6 and finalized by CENELEC TC 8X/WG1 based on an application guide written by the former UNIPEDE Group of Experts NORMCOMP: "Electricity Product Characteristics and Electromagnetic Compatibility"[1].

The aim of this guide is to provide some background information and explanation on the standard EN 50160 "Voltage characteristics of electricity supplied by public distribution systems" [2].

By its very nature, a standard has to be concise and cannot give a comprehensive background of the subject being dealt with. It was accordingly decided to prepare a guide providing additional information and clarification of the standard.

1.2 Background of the definition of supply voltage characteristics

From the very beginning of their association, the Member States of the European Communities decided to create a wide economic area without barriers to internal trade.

For this purpose a number of directives have been issued by the Commission of the European Community (EC), to remove the differences in the legislation of the Member States, which could affect the free exchange of goods and services.

One such directive is the Directive 85/374 on Product Liability [3]. This states in Article 2 that "product" includes electricity for the purpose of the directive. Consequently, it was considered necessary to define the essential characteristics of the electricity supply.

The task of preparing a standard, based on the UNIPEDE document DISNORM 12 [4], was assigned to CENELEC (European Committee for Electrotechnical Standardisation). The request specified the different aspects to be covered, which were exclusively related to the following characteristics of the supply voltage: **frequency**, **magnitude**, **waveform** and **symmetry** of the three-phase-voltages.

For this task CENELEC set up a new task force, BTTF 68-6, in which representatives of most of its member countries participated. EN 50160 was prepared by this task force, and was duly ratified by CENELEC.

2 Application of the European Standard EN 50160

2.1 Introduction

The standard takes account of the fact that electricity distribution systems have to be developed taking into account the problem of providing adequate conditions for the operation of customers' equipment and, at the same time, avoiding unnecessary increases in the cost of the electricity supply. There is an economic balance to be struck between the costs attributable to creating a more benign environment for the use of equipment connected to the public electricity network which will be borne by all customers and the costs of achieving immunity of the equipment to the environment in which it is intended to be used which will rightly be borne by the customer purchasing the equipment.

2.2 Scope of the European Standard

It is important to note that the scope of the standard is confined to the electricity supplied at the supply terminals, and does not deal with the supply system or the customer's installation or equipment. The diagram below in Figure 1 illustrates the point which is defined in EN 50160 as "the supply terminals" and also the relationship between the impulse withstand requirements of the supply terminals, the customer's installation and the customer's electrical equipment. The appropriate categories of impulse voltage withstand for each zone are also highlighted. It should be stressed that the supply terminals, referred to in both the standard and this application guide, and the origin of the installation, referred to in both IEC 60664-1, Insulation coordination for equipment within low-voltage systems [5], and IEC 60364-4-44, Electrical Installations of buildings – Part 4 Protection for Safety Chapter 44 Protection against overvoltages (HD 384-4-443) [6], are one and the same point.

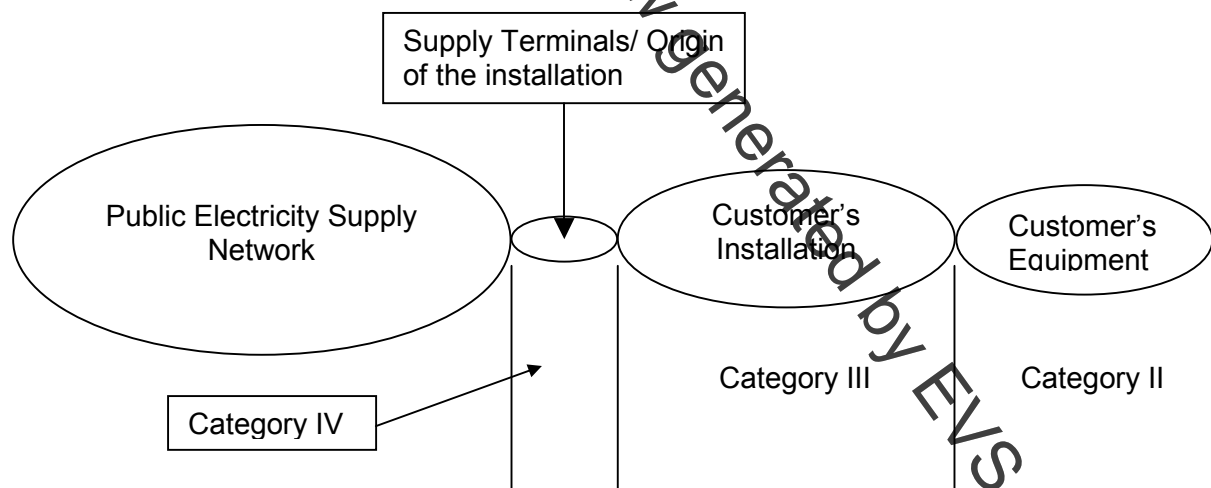


Figure 1 – Illustration of location of supply terminals

As the standard is intended to deal only with the characteristics of the voltage at specified points on the public distribution networks, it does not deal directly with the characteristics of networks themselves, such as short circuit power. Clearly, however, the network characteristics will have an effect upon the magnitude of several of the phenomena described by the standard.