SRI LANKA STANDARD 1259 : 2003
IEC 60038 : 1983

SPECIFICATION FOR

SRI LANKA STNADARD VOLTAGES FOR ELECTRICAL SYSTEMS

SRI LANKA STANDARDS INSTITUTION

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SLS 1259 : 2003
IEC 60038 : 1983

Gr. C

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SRI LANKA STANDARD
SPECIFICATION FOR SRI LANKA STNADARD VOLTAGES FOR ELECTRICAL SYSTEMS

NATIONAL FOREWORD

This standard was approved by the Sectoral Committee on Electrical Appliances and Accessories and was authorized for adoption and publication as a Sri Lanka Standard by the Council of Sri Lanka Standards Institution on 2003 –10-22.

This Sri Lanka Standard is identical with IEC 60038 : Standard voltages, including Amd No. 1 and Amd No. 2. The existing Sri Lanka Standard SLS 574 : 1982 : Specification for voltage, current and frequency ratings is superseded by this standard.

Terminology and conventions

The text of the International standard has been accepted as suitable for publication except Series II of Table 3 since it is not applicable to Electrical Systems used in Sri Lanka. However certain terminology and conventions are not identical with those use in Sri Lanka Standards.
Attention is therefore drawn to the following :

a) Wherever the words "International Standard appear referring to this standard they should be interpreted as "Sri Lanka Standard"
b) Wherever the page numbers are quoted they are page numbers of IEC standard.

Cross references in the International Standard : Nil

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

I E C STANDARD VOLTAGES

FOREWORD

1) The formal decisions or agreements of the I E C on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.
2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.
3) In order to promote international unification, the I E C expresses the wish that all National Committees should adopt the text of the I E C recommendation for their national rules in so far as national conditions will permit. Any divergence between the I E C recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.

PREFACE

This publication has been prepared by I E C Technical Committee No. 8, Standard Voltages, Current Ratings and Frequencies.

This sixth edition supersedes the fifth edition of I E C Publication 38 (1975), and now includes standard voltages below 120 V a.c. and 750 V d.c.

The National Committees of the following countries voted explicitly in favour of publication of the fifth edition:

Australia	Germany	Romania
Austria	Hungary	South Africa (Republic of)
Belgium	Israel	Spain
Czechoslovakia	Italy	Sweden
Denmark	Netherlands	Switzerland
Egypt	Norway	Turkey
Finland	Poland	Union of Soviet Socialist Republics
France	Portugal	

After the issue, in 1977, of Amendment No. 1 to the fifth edition of I E C Publication 38, a draft revision was discussed at the meetings held in Moscow in 1977, in Sydney in 1979 and in Dubrovnik in 1980. As a result of this latter meeting, two new drafts, Documents 8(Central Office)1132 and 1133, were submitted to the National Committees for approval under the Six Months' Rule in January and March 1981.

The National Committees of the following countries voted explicitly in favour of the publication of Document 8(Central Office)1133, concerning the addition of Clause 4 and the amendment to Table I:

Australia	Italy	Sweden
Belgium	Korea (Democratic People's Republic of)	Switzerland
Egypt	Netherlands	Union of Soviet Socialist Republics
Finland	Norway	United States of America
France	Romania	
Germany	South Africa (Republic of)	
Ireland		

The National Committees of the following countries voted explicitly in favour of the publication of Document 8(Central Office)1132, concerning the addition of Table VI:

Australia	Germany	Switzerland
Austria	Ireland	Turkey
Belgium	Israel	Union of Soviet Socialist Republics
China	Netherlands	United Kingdom
Egypt	Norway	United States of America
Finland	Poland	
France	Sweden	

I E C STANDARD VOLTAGES

Scope

This publication applies to:

— a.c. transmission, distribution and utilization systems and equipment for use in such systems with standard frequencies 50 Hz and 60 Hz having a nominal voltage above 100 V;

— a.c. and d.c. traction systems;

— a.c. and d.c. equipment having nominal voltages below 120 V a.c. or below 750 V d.c., the a.c. voltages being intended (but not exclusively) for 50 Hz and 60 Hz applications; such equipment covers batteries (from primary or secondary cells), other power supply devices (a.c. or d.c.), electrical equipment (including industrial and communication), and appliances.

This publication shall not apply to voltages representing or transmitting signals or measured values.

This publication shall not apply to standard voltages of components and parts used within electrical devices or items of equipment.

SECTION ONE — DEFINITIONS

For alternating voltages, the voltages stated below are r.m.s. values.

1. **Nominal voltage**

Voltage by which a system or equipment is designated and to which certain operating characteristics are referred.

2. **Highest and lowest voltages of a system (excluding transient or abnormal conditions)**

2.1 *Highest voltage of a system*

The highest value of voltage which occurs under normal operating conditions at any time and at any point on the system.

It excludes voltage transients, such as those due to system switching, and temporary voltage variations.

2.2 *Lowest voltage of a system*

The lowest value of voltage which occurs under normal operating conditions at any time and at any point on the system.

It excludes voltage transients, such as those due to system switching, and temporary voltage variations.

3. Highest voltage for equipment

Highest voltage for which the equipment is specified regarding:

a) the insulation;

b) other characteristics which may be referred to this highest voltage in the relevant equipment recommendations.

The highest voltage for equipment is the maximum value of the "highest system voltage" (see Sub-clause 2.1) for which the equipment may be used.

Notes 1. — The highest voltage for equipment is indicated for nominal system voltages higher than 1 000 V only. It is understood that, particularly for certain nominal system voltages, normal operation of equipment cannot be ensured up to this highest voltage for equipment, having regard to voltage sensitive characteristics such as losses of capacitors, magnetizing current of transformers, etc.

In such cases, the relevant recommendations must specify the limit to which the normal operation of this equipment can be ensured.

2. — It is understood that the equipment to be used in systems having nominal voltage not exceeding 1 000 V should be specified with reference to the nominal system voltage only, both for operation and for insulation.

4. Supply terminals

The point of delivery of electricity from the distribution system of the electricity supply authority to the consumer.

SECTION TWO—TABLES OF STANDARD VOLTAGES

TABLE I

A.C. systems having a nominal voltage between 100 V and 1 000 V inclusive and related equipment

In the following table, the three-phase, four-wire systems and single-phase three-wire systems include single-phase circuits (extensions, services, etc.) connected to these systems.

The lower values in the first column are voltages to neutral and the higher values are voltages between phases. When one value only is indicated, it refers to three-wire systems and specifies the voltage between phases. The lower value in the second column is the voltage to neutral and the higher value is the voltage between lines.

The voltages in excess of 230/400 V are intended exclusively for heavy industrial applications and large commercial premises.

Three-phase four-wire or three-wire systems	Single-phase three-wire systems
Nominal voltage (V)	Nominal voltage (V)
—	120/240
230/400 [1]	—
277/480 [2]	—
400/690 [1]	—
1 000	—

Under normal system conditions it is recommended that the voltage at the supply terminals should not differ from the nominal voltage by more than $\pm 10\%$.

[1] The nominal voltage of existing 220/380 V and 240/415 V systems shall evolve towards the recommended value of 230/400 V. The transition period should be as short as possible and should not exceed 20 years after the issue of this I E C publication. During this period, as a first step, the electricity supply authorities of countries having 220/380 V systems should bring the voltage within the range 230/400 V $^{+6\%}_{-10\%}$ and those of countries having 240/415 V systems should bring the voltage within the range 230/400 V $^{+10\%}_{-6\%}$. At the end of this transition period the tolerance of 230/400 V $\pm 10\%$ should have been achieved; after this the reduction of this range will be considered. All the above considerations apply also to the present 380/660 V value with respect to the recommended value 400/690 V.

[2] Not to be utilized together with 230/400 V or 400/690 V.

TABLE II

D.C. and a.c. traction systems *

	Voltage			Rated frequency of a.c. systems (Hz)
	Lowest (V)	Nominal (V)	Highest (V)	
D.C. systems	(400) 500 1 000 2 000	(600) 750 1 500 3 000	(720) 900 1 800 3 600 **	
A.C. single-phase systems	(4 750) 12 000 19 000	(6 250) 15 000 25 000	(6 900) 17 250 27 500	50 or 60 16 ⅔ 50 or 60

* The values indicated in parentheses should be considered as non-preferred values. It is recommended that these values should not be used for new systems to be constructed in future. In particular for a.c. single-phase systems, the nominal voltage 6 250 V should be used only when local conditions make it impossible to adopt the nominal voltage 25 000 V.

The values indicated in the table above are the values agreed by the International Mixed Committee on Electric Traction Equipment (C.M.T.) and by I E C Technical Committee No. 9, Electric Traction Equipment.

** In certain European countries, this voltage may reach 4 000 V. The electrical equipment of vehicles operating international services in these countries shall be capable of withstanding this absolute maximal voltage for brief periods of up to 5 min.

TABLE III

A.C. three-phase systems having a nominal voltage above 1 kV and not exceeding 35 kV and related equipment *

Two series of highest voltages for equipment are given below, one for 50 Hz and 60 Hz systems (Series I), the other for 60 Hz systems (Series II—North American practice). It is recommended that only one of these series should be used in any one country.

It is also recommended that only one of the two series of nominal voltages given for Series I should be used in any one country.

Series I			Series II	
Highest voltage for equipment (kV)	Nominal system voltage (kV)		Highest voltage for equipment (kV)	Nominal system voltage (kV)
3.6 [1]	3.3 [1]	3 [1]	4.40 [1]	4.16 [1]
7.2 [1]	6.6 [1]	6 [1]	—	—
12	11	10	—	—
—	—	—	13.2 [2]	12.47 [2]
—	—	—	13.97 [2]	13.2 [2]
—	—	—	14.52 [1]	13.8 [1]
(17.5)	—	(15)	—	—
24	22	20	—	—
—	—	—	26.4 [2]	24.94 [2]
36 [3]	33 [3]	—	—	—
—	—	—	36.5 [2]	34.5 [2]
40.5 [3]	—	35 [3]	—	—

* Theses systems are generally three-wire systems unless otherwise indicated. The values indicated are voltages between phases.
The values indicated in parentheses should be considered as non-preferred values. It is recommended that these values should not be used for new systems to be constructed in future.

Notes 1. — It is recommended that in any one country the ratio between two adjacent nominal voltages should be not less than two.

2. — In a normal system of Series I, the highest voltage and the lowest voltage do not differ by more than approximately ± 10% from the nominal voltage of the system. In a normal system of Series II, the highest voltage does not differ by more than +5% and the lowest voltage by more than −10% from the nominal voltage of the system.

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[1] These values should not be used for public distribution systems.

[2] These systems are generally four-wire systems.

[3] The unification of these values is under consideration.

TABLE IV

A.C. three-phase systems having a nominal voltage above 35 kV and not exceeding 230 kV and related equipment *

Two series of nominal system voltages are given below. It is recommended that only one of the two series should be used in any one country.

It is recommended that in any one country only one value in the following groups should be used for the highest voltage for equipment:

123 kV-145 kV

245 kV-300 kV (see Table V)-363 kV (see Table V).

Highest voltage for equipment (kV)	Nominal system voltage (kV)	
(52)	(45)	—
72.5	66	69
123	110	115
145	132	138
(170)	(150)	—
245	220	230

* The values indicated in parentheses should be considered as non-preferred values. It is recommended that these values should not be used for new systems to be constructed in future. The values are voltages between phases.

TABLE V

A.C. three-phase systems having a highest voltage for equipment exceeding 245 kV [1]

It is recommended that in any one geographical area only one value in the following groups should be used for the highest voltage for equipment:

245 kV (see Table IV)-300 kV-363 kV

363 kV-420 kV

420 kV-525 kV

Highest voltage for equipment (kV)
(300)
(363)
420
525 [2]
765 [3]
1 200 [4]

[1] The values indicated in parentheses should be considered as non-preferred values. It is recommended that these values should not be used for new systems to be constructed in future. The values are voltages between phases.

[2] The value 550 kV is also used.

[3] It is permissible to adopt values between 765 kV and 800 kV provided that the test values for equipment should be the same as defined by the I E C for 765 kV.

[4] An intermediate value between 765 kV and 1 200 kV, sufficiently distant from these two values, will be introduced later in the table if a certain region of the world considers it necessary. In such a case in any one geographical area where the intermediate value is adopted, neither the value 765 kV nor the value 1 200 kV should be used.

Note. — In the present table, the terms "a certain region of the world" and "geographical area" may indicate a single country, a group of countries which agree to adopt the same voltage level, or a part of a very large country.

TABLE VI

Equipment having a nominal voltage below 120 V a.c. or below 750 V d.c.

D.C.		A.C.	
Nominal values		Nominal values	
Preferred (V)	Supplementary (V)	Preferred (V)	Supplementary (V)
	2.4		
	3		
	4		
	4.5		
	5		5
6		6	
	7.5		
	9		
12		12	
	15		15
24		24	
	30		
36			36
	40		
			42
48		48	
60			60
72			
	80		
96			
			100
110		110	
	125		
220			
	250		
440			
	600		

Notes 1. — Because the voltage of the primary and secondary cells is below 2.4 V, and the choice of the type of cell to be used in various applications will be based on properties other than the voltage, these values are not included in the table. The relevant I E C Technical Committees may specify types of cells and related voltages for specific applications.

2. — It is recognized that for technical and economic reasons additional voltages may be required for certain specific fields of application.

NORME INTERNATIONALE
INTERNATIONAL STANDARD

CEI
IEC
38

1983

AMENDEMENT 1
AMENDMENT 1

1994-08

Amendement 1

Tensions normales de la CEI

Amendment 1

IEC standard voltages

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Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

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FOREWORD

This amendment has been prepared by IEC technical committee 8: Standard voltages, current ratings and frequencies.

The text of this amendment is based on the following documents:

DIS	Report on voting
8(CO)1137+1137A	8(CO)1138

Full information on the voting for the approval of this amendment can be found in the report on voting indicated in the above table.

Page 7

SECTION ONE – DEFINITIONS

1 Nominal voltage

Replace the title and text of this clause by the following:

1 Nominal system voltage

Voltage by which a system is designated.

2 Highest and lowest voltages of a system (excluding transient or abnormal conditions)

This correction applies to the French text only.

Page 9

Replace the existing clauses 3 and 4 by the following new clauses:

3 Supply terminals

The point where the distribution system of the electricity supply authority and the electrical system of the consumer are connected.

4 Supply voltage

The phase-to-phase or phase-to-neutral voltage at the supply terminals.

5 Supply voltage range

The voltage range at the supply terminals.

6 Utilization voltage

The phase-to-phase or phase-to-neutral voltage at the outlets or at the terminals of equipment.

7 Utilization voltage range

The voltage range at the outlets or at the terminals of equipment.

8 Rated voltage (of equipment)

The voltage assigned generally by a manufacturer, for a specified operating condition of a component, device or equipment.

9 Highest voltage for equipment

Highest voltage for which the equipment is specified regarding:

a) the insulation;

b) other characteristics which may be referred to this highest voltage in the relevant equipment recommendations.

The highest voltage for equipment is the maximum value of the "highest system voltage" (see 2.1) for which the equipment may be used.

NOTES

1 The highest voltage for equipment is indicated for nominal system voltages higher than 1 000 V only. It is understood that, particularly for certain nominal system voltages, normal operation of equipment cannot be ensured up to this highest voltage for equipment, having regard to voltage-sensitive characteristics such as losses of capacitors, magnetizing current of transformers, etc.

In such cases, the relevant recommendations must specify the limit to which the normal operation of this equipment can be ensured.

2 It is understood that the equipment to be used in systems having nominal voltage not exceeding 1 000 V should be specified with reference to the nominal system voltage only, both for operation and for insulation.

3 Attention is drawn to the fact that in some equipment standards (for example, IEC 335-1 and IEC 71) the term "voltage range" has a different meaning.

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SECTION TWO – TABLES OF STANDARD VOLTAGES

TABLE 1

Replace the existing table 1 by the following new table:

Table 1 – A.C. systems having a nominal voltage between 100 V and 1 000 V inclusive and related equipment

In the following table, the three-phase four-wire systems and single-phase three-wire systems include single-phase circuits (extensions, services, etc.) connected to these systems.

The lower values in the first and second columns are voltages to neutral and the higher values are voltages between phases. When one value only is indicated, it refers to three-wire systems and specifies the voltage between phases. The lower value in the third column is the voltage to neutral and the higher value is the voltage between lines.

The voltage in excess of 230/400 V are intended exclusively for heavy industrial applications and large commercial premises.

Three-phase four-wire or three-wire systems		Single-phase three-wire systems
Nominal voltage V		Nominal voltage V
50 Hz	60 Hz	60 Hz
–	120/208	120/240
–	240	–
230/400 [1)]	277/480	–
400/690 [1)]	480	–
–	347/600	–
1 000	600	–

1) The nominal voltage of existing 220/380 V and 240/415 V systems shall evolve toward the recommended value of 230/400 V. The transition period should be as short as possible and should not exceed the year 2003. During this period, as a first step, the electricity supply authorities of countries having 220/380 V systems should bring the voltage within the range 230/400 V +6 %, −10 % and those of countries having 240/415 V systems should bring the voltage within the range 230/400 V +10 %, −6 %. At the end of this transition period, the tolerance of 230/400 V ±10 % should have been achieved; after this the reduction of this range will be considered. All the above considerations apply also to the present 380/660 V value with respect to the recommended value 400/690 V.

Concerning supply voltage range, under normal service conditions, it is recommended that the voltage at the supply terminals should not differ from the nominal voltage of the system by more than ±10 %.

For the utilization voltage range, in addition to the voltage variations at the supply terminals, voltage drops may occur within the consumer's installations. For low-voltage installations, this voltage drop is limited to 4 %, therefore, the utilization voltage range is +10 %, −14 %[1)]. This utilization range should be taken into account by Product Committees.

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1) At the end of the transition period, the reduction of this range will be considered.

NORME INTERNATIONALE

INTERNATIONAL STANDARD

CEI
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60038

1983

AMENDEMENT 2
AMENDMENT 2

1997-10

Amendement 2

Tensions normales de la CEI

Amendment 2

IEC standard voltages

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International Electrotechnical Commission
Международная Электротехническая Комиссия

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FOREWORD

This amendment has been prepared by IEC technical committee 8: Standard voltages, current ratings and frequencies.

The text of this amendment is based on the following documents:

FDIS	Report on voting
8/1165/FDIS	8/1166/RVD

Full information on the voting for the approval of this amendment can be found in the report on voting indicated in the above table.

Page 17

Table V

Replace the existing table by the following new table:

Table 5 – AC three-phase systems having a highest voltage for equipment exceeding 245 kV[1)]

It is recommended that in any one geographical area only one value in the following groups should be used for the highest voltage for equipment:

245 kV (see table IV)-300 kV-362 kV

362 kV-420 kV

420 kV-550 kV

Highest voltage for equipment kV
(300)
362
420
550[2)]
800[3),5)]
1050[4)]
1200[5)]

1) The values indicated in parentheses should be considered as non-preferred values. It is recommended that these values should not be used for new systems to be constructed in future. The values are voltages between phases.

2) The value 525 kV is also used.

3) The value 765 kV is also used; the test values for equipment should be the same as defined by the IEC for 765 kV.

4) The value 1100 kV is also used.

5) In any one geographical area where the 1050 kV value is adopted, neither the value 800 kV nor the value 1200 kV should be used.

NOTE – In the present table, the term "geographical area" may indicate a single country, a group of countries which agree to adopt the same voltage level, or a part of a very large country.

SRI LANKA STANDARDS INSTITUTION

The Sri Lanka Standards Institution (SLSI) is the National Standards Organization of Sri Lanka established under the Sri Lanka Standards Institution Act No. 6 of 1984 which repealed and replaced the Bureau of Ceylon Standards Act No. 38 of 1964. The Institution functions under the Ministry of Science & Technology.

The principal objects of the Institution as set out in the Act are to prepare standards and promote their adoption, to provide facilities for examination and testing of products, to operate a Certification Marks Scheme, to certify the quality of products meant for local consumption or exports and to promote standardization and quality control by educational, consultancy and research activity.

The Institution is financed by Government grants, and by the income from the sale of its publications and other services offered for Industry and Business Sector. Financial and administrative control is vested in a Council appointed in accordance with the provisions of the Act.

The development and formulation of National Standards is carried out by Technical Experts and representatives of other interest groups, assisted by the permanent officers of the Institution. These Technical Committees are appointed under the purview of the Sectoral Committees which in turn are appointed by the Council. The Sectoral Committees give the final Technical approval for the Draft National Standards prior to the approval by the Council of the SLSI.

All members of the Technical and Sectoral Committees render their services in an honorary capacity. In this process the Institution endeavours to ensure adequate representation of all view points.

In the International field the Institution represents Sri Lanka in the International Organization for Standardization (ISO), and participates in such fields of standardization as are of special interest to Sri Lanka.

Printed at the Sri Lanka Standards Institution, 17, Victoria Place, Elvitigala Mawatha, Colombo 08.

SLS CERTIFICATION MARK

The Sri Lanka Standards Institution is the owner of the registered certification mark shown below. Beneath the mark, the number of the Sri Lanka Standard relevant to the product is indicated. This mark may be used only by those who have obtained permits under the SLS certification marks scheme. The presence of this mark on or in relation to a product conveys the assurance that they have been produced to comply with the requirements of the relevant Sri Lanka Standard under a well designed system of quality control inspection and testing operated by the manufacturer and supervised by the SLSI *which includes surveillance inspection of the factory, testing of both factory and market samples.*

Further particulars of the terms and conditions of the permit may be obtained from the Sri *Lanka Standards Institution, 17, Victoria Place, Elvitigala Mawatha, Colombo 08.*

Printed at SLSI (Printing Unit)