

**STRATEGIC BUSINESS PLAN (SBP)**

IEC/TC or SC 64	Secretariat Germany	Date 2011-07
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Title of TC
Electrical installations and protection against electric shock

A Background**A.1 History**

a) First wiring rules

The first set of independent regulations was produced in the United Kingdom by the Institution of Electrical Engineers in 1882, to be followed in 1896 by the Verband Deutscher Elektrotechniker in Germany and in 1911 by the Union des Syndicats de l'Electricité in France.

The National Electrical Code in North America, the first edition of which appeared in 1897, is a voluntary standard which is published by the National Fire Protection Association. It is adopted into law for regulatory purposes in the various individual States who have the responsibility for establishing requirements.

b) Setting up of IEC TC 64 Electrical installation

Standardization of wiring rules was first discussed at an IEC council meeting in 1908 but it was decided not to proceed with the preparation of a Standard. Between 1908 and 1965 the question was discussed on a number of occasions and in 1965 the IEC Committee of Action set up a Working Group to consider the practicality of achieving international agreement on the unification of certain aspects of wiring rules.

This work was actively encouraged by the United Nations Educational Scientific and Cultural Organisation, who saw that developing countries needed assistance in developing rules for domestic electrical installations.

Following the report of the working group, the IEC Council set up a new Technical Committee in 1967. Its scope required to prepare in a first step recommendations on the fundamental principles concerning safety and related matters in fixed wiring electrical installations. The scope excluded matters relating to equipment and operational rules. The Committee was given the number 64.

A.2 Scope

The present scope of IEC TC 64 is to prepare International Standards

- concerning protection against electric shock arising from equipment, from installations and from systems without limit of voltage;
- for the design, erection foreseeable correct use and verification of all kind of electrical installations at supply voltage up to 1 kV a.c. or 1,5 kV d.c., except those installations covered by the following IEC committees: TC 9, TC 18, TC 44, TC 97, TC 99.

The standards will not cover individual items of electrical equipment other than their selection for use, taking into consideration the appropriate products characteristics and classifications.

TC64 has got the safety pilot function: protection against electric shock. Therefore the respective publications in this field have the status of Basic Safety Publications.

B Business environment

B.1 General

TC 64 is responsible of two types of publications:

- a) Standards covering low-voltage electrical installations (IEC 60364 series, and related guides IEC 61200 series, IEC 62066). These standards are mainly targeted to electrical installations designers, electrical contractors and electrical installations controllers.

The IEC 60364 series covers all types of low-voltage electrical installations such as those of:

- industrial
- commercial
- residential.

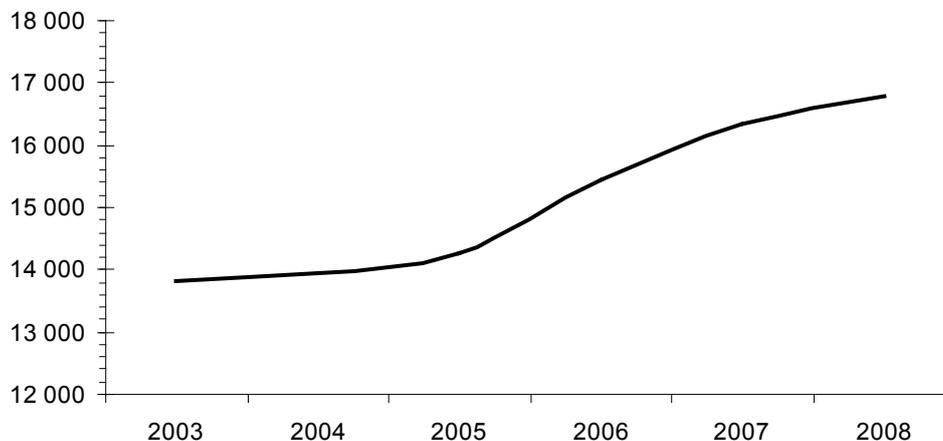
Premises but also further types of installations (details see scope of IEC 60364-1). It applies to the design, erection, and verification of electrical installations.

TC 64 takes into account the fact that low-voltage electrical installations are designed, erected and verified according to national standards. National Committee may adapt the requirements according to local or regional habits while keeping the international standard structure and main content.

As most of electricity is used in low voltage by electrical products, an estimation of the evolution of the worldwide electrical consumption may give some idea of the evolution of the worldwide market for electrical installations.

From the here below figure it can be easily noticed that world electricity consumption still increases, which means that the number of electrical installation still increases.

World electricity consumption in TWh



The world electricity consumption has increased by more than 21% between 2003 and 2008.

b) Publications under the pilot function according to Guide 104 (IEC 60364-4-41, IEC 60364-5-54, IEC 60449, IEC 60479 series, IEC 61140 and IEC 61201) concern protection against electric shock.

In 2005 ACOS made a survey in TC/SC publications and listed publications referring to all BSP. The result of this survey for TC64 is as follows:

Basic Safety Publication	TC/SCs citing BSP in the normative references of their publications
	IEC 60364-5-54 17D, 20, 22, 27, 44, 48B, 64, 65C, 77C, 100
IEC 60449 1	34C, 64, 96
IEC 60479-1 TS	9, 27, 64, 99, 101, 108
IEC 60479-3 TS	
IEC 61140	9, 17A, 17B, 17D, 18, 22, 22H, 23B, 23G, 26, 48B, 64, 82, 96, 97, 99, 108
IEC 61201	

It should also be noted that 33 countries have opted for being P member of TC 64 and 14 countries have decided to be O member of TC 64. With these 47 members TC 64 is situated in 4th position in term of number of members with the IEC TC. There are also 13 affiliate countries who are showing interest in TC 64.

B.2 Market demand

The electrical installation forms the environment for the use of electrical energy and is the interface between electrical equipment and supply systems and thus the market demand is led by the need to provide requirements for the installation of standardized installation equipment so as to allow for the safe use of standardized current-using-equipment.

The result of an enquiry into the basis upon which national rules for electrical installations are based, circulated to 30 P members countries, has confirmed that IEC 60364 is widely used throughout the world as a basis for national installation rules:

- there are countries which use directly IEC 60364 as national standard;
- there are countries which use regional issue of IEC 60364 as basis for their national standards, e.g. CENELEC countries;
- there are countries which do not use IEC 60364 directly but use the principle of IEC 60364-1 as the basis to develop their Country Electric Code (CEC).

This demonstrates not only the high level of interest in international installation rules but also the demand for harmonization work in this field. This can be achieved only by the effective collaboration of members countries in an international organization such as IEC is, open to all interested countries, not only the highly industrialized or big countries but also smaller or less developed countries whose participation may be limited (perhaps to 'O' membership) but whose interest in installation rules is high.

Standards covering low-voltage electrical installations are sometimes used as basis and as support to national legislation.

B.3 Trends in technology

TC 64 standards need continuous development in order to address the use of new electrical equipment on the market (e.g. extended use of converters). They have to take into account the latest technological trends in the work of equipment committees which lead to new or modified equipment standards.

A recent trend in electrical installations is the closer proximity of power current and signal currents used for instance for telecommunication. Power currents certainly influence on quality of signals currents. This phenomenon is already addressed within the electrical

installation standard (IEC 60364) but certainly will need in future to be more deeply considered.

Presence of harmonic currents is increasing in all electrical installations, due to interferences caused by electrical equipment, particularly in the commercial building and industry, but also in some respect in domestic premises. Mitigating the influences of these harmonic currents has strong impact on the design of electrical installations. Coordination with safety requirements will be necessary in order to address correctly the impact of these harmonic currents.

New technologies of power supplies with lower environmental impacts are now emerging (solar photovoltaic system, wind turbines, fuel cells). Moreover new technologies will arise from the connection of electric vehicles to the electrical installations. These new technologies have direct impacts on the design of electrical installations and also on safety requirements to be complied with.

To face increasing ratio between electricity demand and electricity production, electricity utility promote the concept of "smart grid". The objective of this new concept is to better manage the production of electricity as well as the consumption of this electricity. As the majority of this electrical power is consumed in low-voltage, LV electrical installation will certainly be involved by this new concept.

Installation using Direct Current seems to day becoming an opportunity in some application. A larger use of DC in electrical installation will request from TC 64 further investigation concerning safety of persons and properties. Mix of AC and DC installations will also need further work by TC 64. Safety and correct operation of DC electrical installations will drive revision of some parts of the IEC 60364 series.

In a similar way, installations using industrial frequency other than 50 Hz or 60 Hz are within the scope of IEC 60364. There are a number of electrical installations using these frequencies which are not covered by the IEC 60364. Introduction of specific requirements addressing these installations should be introduced within the IEC 60364.

Existing standards covering electrical installations are mainly focused on new installations. Improvement of technology used within the electrical equipment lead changes within the way of designing, erecting and controlling electrical installations. Due to this, existing installations quickly do not comply any longer with latest edition of IEC 60364 parts. On the other hand latest technology of current-using-equipment are daily connected to old electrical installations. As an example, everyone can see more and more multi socket-outlet connected to one fixed socketoutlet, which can result in a decreasing of safety level.

B.4 Market trends

TC 64 belongs to the top ten TCs regularly followed by the affiliate countries program. As a great number of people still do not have access to electricity, countries facing such a situation certainly spend many efforts in providing safe access to electricity within the countryside. The possibility to adopt international installation rules facilitates the safe use of electricity in emerging markets which do not directly participate in the standardization work. Information on background of key requirements introduced in IEC standards covering electrical installations certainly helps its implementation.

Economy fluctuations and reducing the impact of our energy consumption on our environment will impact standards of electrical equipment but also standards covering electrical installations. Energy efficiency will be in the near future one of the key issues for all countries. More and more what will be expected of a good electrical installation will be safety and optimization of the use of electrical energy, making energy efficiency a must in most countries. In addition efficient use of electrical energy due to adapted design of new

installations or modification of existing installations will reduce the carbon emission in the atmosphere.

Impact on climate changes on industrialized countries will promote in near future the use of electric vehicle as transport means has a great influence on carbon emission. Although electricity used by these electric vehicles may be generated from thermal power plant, analysis show that total carbon foot print will be globally in favour of the use of these types of vehicles. TC 64 will be therefore involved in the requirements to be used for the fixed installations for the supply of electric vehicles.

As explained in B.1, electrical consumption still increases but there are still millions of people throughout the world without access to electricity. Many villages in many continents in countryside are not connected to public distribution network. The quickest and cheapest way to have access to electricity is to install local power supplies (generating set, photovoltaic supplies ...). A micro grid may supply few houses in electricity. Although TC 82 has already edited standards covering these micro grids, the private installations should be covered by TC 64.

B.5 Ecological environment

TC64 must provide installation rules which enable an optimised installation of electrical equipment also with respect to EMC effects caused by the currents flowing in the electrical installation.

Electrical equipment to form an electrical installation is selected by the installation designer so as to achieve an installation which will meet its function during its intended life and which, taken as whole in its environment, will meet the requirements of IEC 60364 for safety. This process, of itself, has no environment effects; any such effects occur during the manufacturer of the equipment or its components, or possibly during its use and these effects are the responsibility of the product standard committee concerned. TC 64 can only require, as it does, that equipment selected for use in an installation complies with the relevant international standard.

C System approach aspects

TC 64 understands itself as a system committee which sets the overall safety standards for protection against electric shock and, for installation, determines the characteristics for the selection of electrical equipment to enable the safe use of electricity and the proper functioning of the equipment in the installation environment.

As TC 64 covers requirements for electrical installations and protection against electric shock which incorporate many different types of electrical equipment within one global system. The concept developed for the system approach fully applies to TC 64. The large number of committees having relationship with TC 64 also fully justifies the system approach proposed by TC 64.

Therefore for a good co-ordination between products committees and systems committees, the following has been considered by TC 64.

As stated in the scope of TC 64, requirements included in TC 64 document should not include any product requirements. If TC 64 experts estimate that some specific requirements are missing in product standards, recommendations should be firstly addressed to the relevant product committee for their introduction in product standards.

C.1 Component committees (TC 64 as a customer)

TC 8 Systems aspects for electrical energy supply

TC 16 Basic and safety principles for man-machine interface, marking and identification

SC 17B Low-voltage switchgear and controlgear
SC 17D Low-voltage switchgear and controlgear assemblies
TC 20 Electric cables
SC 23A Cable management systems
SC 23B Plugs, sockets-outlets and switches
SC 23E Circuit-breakers and similar equipment for household use
SC 23F Connecting devices
SC 23H Industrial plugs and socket-outlets
TC 28 Insulation co-ordination
SC 31J Classification of hazardous areas and installation requirements
SC 32B Low-voltage fuses
SC 34C Auxiliaries for lamps
SC 34D Luminaires
SC 37A Low-voltage surge protective devices
TC 44 Safety of machinery - Electrotechnical aspects
TC 61 Safety of household and similar electrical appliances
SC 61H Safety of electrically-operated farm appliances
SC 62A Common aspects of electrical equipment used in medical practice
TC 70 Degrees of protection provided by enclosures
TC 73 Short-circuit currents
TC 81 Lightning protection
TC 82 Solar photovoltaic energy systems
TC 85 Measuring equipment for electrical and electromagnetic quantities
TC 95 Measuring relays and protection equipment
TC 96 Transformers, reactors, power supply units and similar products for low voltage up to 1100 V
TC 99 System engineering and erection of electrical power installations in systems with nominal voltages above 1 kV a.c. and 1,5 kV d.c., particularly concerning safety aspects
TC 104 Environmental conditions, classification and methods of test
TC 108 Safety of electronic equipment within the field of audio/video, information technology and communication technology
TC 109 Insulation co-ordination for low-voltage equipment

C.2 System committees (TC64 as supplier)

TC 9 Electrical equipment and systems for railways
SC 17B Low-voltage switchgear and controlgear
SC 17D Low-voltage switchgear and controlgear assemblies
TC 20 Electric cables
TC 22 Power electronic systems and equipment
SC 22E Stabilized power supplies
SC 22G Adjustable speed electric drive systems incorporating semiconductor power converters
SC 22H Uninterruptible power systems (UPS)
SC 23A Cable management systems
SC 23B Plugs, sockets-outlets and switches
SC 23E Circuit-breakers and similar equipment for household use
SC 23J Switches for appliances

TC 26 Electric welding
TC 27 Industrial electroheating equipment
TC 31 Equipment for explosive atmospheres
SC 31J Classification of hazardous areas and installation requirements
TC 32 Fuses
SC 32B Low-voltage fuses
SC 34C Auxiliaries for lamps
SC 34D Luminaires
SC 37A Low-voltage surge protective devices
TC 40 Capacitors and resistors for electronic equipment
TC 44 Safety of machinery - Electrotechnical aspects
SC 48B Connectors
TC 61 Safety of household and similar electrical appliances
SC 61J Electrical motor-operated cleaning appliances for commercial use
SC 62A Common aspects of electrical equipment used in medical practice
SC 65B Devices and process analysis
SC 65C Industrial networks
TC 69 Electric road vehicles and electric industrial trucks
TC 72 Automatic controls for household use
TC 78 Live working
TC 81 Lightning protection
TC 82 Solar photovoltaic energy systems
TC 85 Measuring equipment for electrical and electromagnetic quantities
TC 88 Wind turbines
TC 95 Measuring relays and protection equipment
TC 96 Transformers, reactors, power supply units and similar products for low voltage up to 1100 V
TC 97 Electrical installations for lighting and beaconing of aerodromes
TC 99 System engineering and erection of electrical power installations in systems with nominal voltages above 1 kV a.c. and 1,5 kV d.c., particularly concerning safety aspects
TC 101 Electrostatics
TC 105 Fuel cell technologies
TC 108 Safety of electronic equipment within the field of audio/video, information technology and communication technology
TC 109 Insulation co-ordination for low-voltage equipment
JTC1/SC25 Interconnection of information technology equipment

C.3 Liaisons

External organizations: CIB (International Council for Building), FISUEL (Fédération Internationale pour la Sécurité des Usagers de l'Electricité), ISSA (International Social Security Association).

Internal IEC: TC 1, TC 16, SC 17B, SC 17D, TC 18, TC 23, SC 23E, SC 34D, SC 37A, TC 44, TC 61, TC 66, SC 77B, TC 81, TC 82, TC 92, TC 96, TC 99, TC 108, TC 109.

D Objectives and strategies (3 to 5 years)

- a) To address correctly the items listed in clause B.4, maintenance cycle of TC 64 standards will be fixed to a reasonable minimum of years (validity to be decided)

case by case) in order to leave time enough to all national committees wishing to understand, translate and implement the standard on electric installations (IEC 60364) in their respective countries.

- b) Coordination with other Technical Committees introducing installation requirements for their products within their product standards is necessary. TC 64 acknowledges that these TCs may certainly have a better knowledge on how their product should be installed than TC 64 experts. However, it is the duty of TC 64 to develop standards on low-voltage electrical installations. IEC 60364 offers the best platform to product TC for introducing their specific requirements on their products as this standard is used throughout the world by hundreds of thousands of electrical contractors. Experts from product TCs are welcome in participating to TC 64 working groups.
- c) When considering requirements on electrical installations, countries which do not participate to the work of the maintenance teams or project teams of TC 64, are encouraged to use and implement national standards or regulations based on IEC 60364. Therefore it is of the TC 64 interest also to carefully consider their specific needs and to verify if they are correctly addressed in TC 64 documents.
- d) The Basic Safety Publications (BSP) should also take into account technical developments and related needs of Technical Committees. This may require from TC 64 to incorporate additional requirements within our BSP. TC 64 carefully considers therefore potential needs of other TCs in order not to hamper with the existing safety aspects of protection against electric shock. This aspect should also be tempered by the fact that Basic Safety Publications have not to be modified too frequently as their content is to be used by many different Technical Committees having so various maintenance cycles for their own documents.

E Action plan

E.1 Current work

The most important work is to elaborate the pilot requirements for protection against electric shock according to the pilot function of the committee. Some necessary amendments became obvious due to continuous developments of installation and product standards. The work on the BSPs needs to be reconsidered at the next plenary meeting.

Other important items are:

- to consider the continuing development of the structure of the IEC 60364;
- revision of IEC 60364-4-44 (Section 443) and IEC 60364-5-53 (Section 534). The maintenance work on these two section have started also in good collaboration with TC 81 and SC 37A;
- revision of IEC 60364-5-53 according to the TC64 decisions following the recommendations of the TC64/CAG

Co-ordination with other committees is also required in particular in relation to the pilot requirements of the TC 64 standards.

New items need to be introduced during the maintenance cycles of some of these standards in order to address the following topics:

- Short-circuit and earth fault proof installations (IEC 60439-1 clause 7.5.5.3) (IEC 61140)
- Restriction of protective conductor current under normal operating conditions, including harmonics (IEC 61140)
- Introduction of report to be proposed after verification of the electrical installation. (IEC 60364-6)

E.2 Future work

Continuous development of installation requirements in the view of steadily progressing equipment requirement and the relevant co-ordination and collaboration with other committees remains evident.

New subjects need to be started in order to keep adequacy between market demand and market trends with requirements of TC 64 documents. As preliminary information the following may be considered as new concepts to be developed within TC 64:

1 st priority		2 nd priority	
Topics	Target date for IS	Topics	Target date for IS
Energy efficiency within electrical installation	2013	Renovation of existing installations in terms of safety	Not relevant
DC installations	Frame of maintenance of different part of IEC 60364	Incorporation of systems for energy storage	Not relevant
Renewable energy power supply	2011-12	Installations using industrial frequencies other than 50/60 Hz.	Not relevant
Supply of electric vehicles	2011-06		
Installations supplied by independent micro grid	To be determined		
Installations to be adapted if supplied by smart grids	To be determined		

F Useful links to IEC web site

[IEC/TC64 dashboard](#) giving access to Membership, TC officers, Scope, Liaison, WG/MT/PT structure, Publications issued along with their stability dates, Work programme and similar information for SCs if any.

Name or signature of the secretary

Reinhard PELTA