

**STRATEGIC BUSINESS PLAN (SBP)**

IEC/TC or SC	Secretariat	Date
44	United Kingdom	2015-09

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Title of TC
Safety of machinery – Electrotechnical aspects

A Background

IEC/TC 44 held its first plenary meeting in Madrid in 1959 with the aim of developing safety related standards for electrical equipment associated with industrial machines, particularly machine tools and large machinery. The 50th anniversary of TC 44 was therefore celebrated in 2009.

The scope of IEC/TC44 has regularly been reviewed and amended to reflect the demands of the business and technological environment in which TC 44 operates to ensure that it continues to meet the needs of the industry sectors it serves.

The present activities comprise three main elements:

- to prepare International Standards relating primarily to electrotechnical equipment and systems of machinery including machinery assemblies, not portable by hand while working.
- to prepare International Standards for electrotechnical equipment and systems relating to the protection of persons from specific machinery hazards taking into account a coordinated system approach ,
- to co-ordinate with ISO all matters concerning safety of machinery.

B Business Environment**B.1 General**

Continuing industrial globalization has considerable economical impact on regional markets related to machinery. The fastest growing markets are expected to be in Asia; also markets in Europe and North America are of major importance in the worldwide development of the machinery industry. The European market is expanding especially in the new eastern economies. The work of TC 44 has a general impact on basic safety strategy in ISO and IEC and TC 44 standards are referred to in many other International and regional Standards.

The overall machinery business has dramatically changed during the last few years. Today, many business contracts are to local specifications. International Standards play an important role to assure that the equipment produced locally and the ones shipped can be installed on site without any interface problems. The increased use of electronics in safety related applications of machinery around the world has been duly taken into account by IEC TC 44 with the recently published standards IEC 62061 (functional safety) and IEC 61496 series (Electrosensitive Safety Protective Equipment).

Worldwide market (sales for 2013)

For machinery the worldwide market is approximately 2.245 billion Euros, the share of electrical equipment within this volume is about 30% and is growing. Geographic segmentation: 16% North America, 50% Asia/Pacific and 31% Europe (EU).

The world market for the electrosensitive protective devices covered by the IEC 61496 series is approximately 350 million Euros.

B.2 Market demand

Customers for TC 44 standards include manufacturers, test houses, market surveillance authorities, and product committees of IEC and ISO. IEC 60204-1 is referenced in several hundreds of IEC, ISO and CEN standards.

As all TC 44 standards are safety related, they are widely used both

- by regulators for detailing their technical laws and regulations (e.g. European Machinery Directive 2006/42/EC) and
- in B2B contracts.

The publication of the horizontal safety standards in the IEC 61508 series by IEC/SC 65A created an urgent need for a machine sector standard, which was published in January 2006 as IEC 62061.

Due to the extension of the scope of ISO 13849-1 there is unfortunately an overlap with IEC 62061. In order to resolve the problem IEC/TC 44 and ISO/TC 199 have produced a common TR which has been published in IEC as IEC/TR 62061-1 with identical text being published in ISO. For the next edition of both standards closer cooperation is taking place. A new work item for the merging of IEC 62061 and ISO 13849-1 is currently under vote in IEC and ISO and if approved in both organizations will be progressed by a JWG under mode 5 cooperation. In the meantime IEC 62061 will be maintained with a stability date of not earlier than 2016.

In cases where inherent safety cannot be achieved by inherent safety measures with reasonable economic effort appropriate technical protective measures are required. For these applications the market requires more modern technical solutions and these can be satisfied by, for example, electrosensitive protective equipment (ESPE). This market requirement is driving the maintenance work for IEC 61496 parts 1, 2, 3 and 4.

A demand has been recognized for guidance on the application of presence sensing equipment to machinery and work has taken place in coordination with ISO/TC 199 to satisfy this need resulting in the publication of IEC/TS 62046.

Latest trends on autonomous systems like AGV, service robotics used in public areas or human machine interaction in industry show an increasing demand for new sensor technologies and new kind of sensor functions with respect to hazard exposure of persons. Navigation or localization is one of the most important functions required to guide an autonomous system in a more or less known surrounding.

Collaborative industrial robots are complex machines which work hand in hand with an operator. In a shared work process, they support and relieve the operator. To avoid collision between the robot and the operator and allow for efficient production new protective equipment is needed. Such sensors must be able to reconstruct 3D object shapes from sensor data. Also flexible tracking of objects may be possible using such sensors.

B.3 Trends in technology

The following technology trends are an ongoing process:

- safety functions,
- functional safety incl. software,
- development and application of smart sensors,
- remote diagnostics of plant and equipment,
- use of communication networks (bus systems) for machinery safety related control functions,
- cableless control,
- switching devices on semiconductor basis,
- security.

Presently worldwide discussion of IoT (Internet of Things) will have a heavy impact on future on safety-related automation aspects, and consequently also on safety aspects which is in the scope of TC 44. This includes primarily the following trends:

- new kind of network(s) and infrastructure,
- on the way to “Cyber Physical Systems and Industry 4.0” – Driving the Digital Enterprise,
- application in the light of “tactile internet” (e.g. 5th generation of mobile communication),
- data management (computing cloud, product data and IDL (Intelligent Data-Logistic)),
- security related safety aspects (e.g. in CENELEC Guide 32 and in future IEC Guide 116).

As far as already applicable for safety related aspect as the present editions of TC 44 standards duly reflect the “state of the art”. Further new developments of these trends will be taken into account as soon as they are mature enough for safety related applications in the machinery field. This is particularly true with regard to IEC 61496-4 which is being split into three sub parts. The impact on TC 44 work will be that National Committees will continue to need to provide experts experienced in the latest state of the art in safety related software technology.

Consumer and games industry applications have brought up 3D sensor technology beside other technology sensors that might be used for the detection of a human being or parts of it. It is known trend that such technology may be enhanced to use it for safety technology. Standardization should allow for faster development and implementation of new, innovative sensors or sensor systems which are used as subsystems in a safety-related system.

B.4 Market trends

TC 44 has to address the increased worldwide applicability of its standards. For machine manufacturers the global market does not only mean the removal of barriers to trade for single machines but globally operating customers (e.g. car manufacturers, chemical industry). They will expect common solutions which can be used not only in one country or region but worldwide in order that they can harmonize their sites and plants globally to:

- rationalize their production procedures,
- save costs by means of globally organized purchase of production equipment,
- apply unified technical occupational health and safety provisions.

The consequence of these market trends will be that TC 44 fosters its activities to increase worldwide applicability of its standards encouraging National Committees to actively contribute to the IEC TC 44 standardization work and to implement these International Standards identically at national and regional levels.

B.5 Ecological environment

IEC/TC 44 considers that although the effect on the environment of electrical equipment within its scope is very small it should be considered in future work. TC 44 standards do not deal with the product requirements of components because these are dealt with in the relevant product TCs. Only enclosures may need specific ecological requirements in TC 44 standards. Provisions for energy efficiency and disposal /recycling are taken into account in the activities of TC 44.

C System approach aspects

The publications of IEC/TC 44 are referenced in the ISO A-, B-, C- standards system for machinery:

A-standards describe the basic principles of machinery safety as well as a systematic risk assessment. Presently ISO 12100 is the only A-standard (ISO/ TC 199) relevant for TC 44 activities.

B1- type standards deal with the requirements of risk reduction for the specific hazards associated with a machine or an assembly of machines, B2-type standards describe the requirements for specific safety devices (emergency stop, two-hand controls, light curtains etc.).

C-type standards describe the requirements for specific machine types.

IEC 60204-1 is a typical example of a B1-type standard. If there is no C-type standard available for a certain kind of machine, this standard can also be applied directly for electrical hazards.

IEC/TC 44 acts as supplier for the following IEC committees where TC 44 standards are referenced: TC 2, TC 3, SC 121A, SC 121B, SC 22 G, TC 26, TC 27, TC 64, TC 88, TC 105.

IEC/TC 44 is a customer of the following committees whose standards TC 44 reference: SC 121A, SC 121B, TC 64, TC 99, TC 65, SC 65A, TC 77, TC 78, TC 89 and CISPR.

The major customers of TC 44 standards are Technical Committees dealing with machinery safety within ISO and CEN. An overview of such committees is given in the appendix.

D Objectives and strategies

- To keep TC 44 standards up to date in order to reflect new/changing technologies and to be state of the art at the time they are drafted.
- Proactive monitoring and evaluation of new technology trends (see for example clause B.3) to initiate in

time the consideration into the relevant standards or by creating new standard(s).

- Establish mode 5 cooperation with ISO/TC 199 to merge IEC 62061 and ISO 13849-1 into a dual logo ISO/IEC standard.
- To revise IEC 61496-4 (vision based protective devices) to convert it from a TR to a TS.
- To increase worldwide awareness of TC 44 standards by:
 - Making Industrial customers who apply TC 44 standards directly aware through contact with NCs, workshops, presentations and other distributed material.
 - Technical Committees of IEC and ISO which reference TC 44 standards

E Action plan

Action	Target date
<ul style="list-style-type: none"> ▪ To merge IEC 62061 with ISO 13849-1. A new work item is currently under vote in IEC and ISO and if approved in both organizations will be progressed by a JWG under mode 5 co-operation. 	All work to be completed by 2017
<ul style="list-style-type: none"> ▪ Implementation of a study group Proactive monitoring and evaluation of new technology trends (see for example clause B.2) to initiate in time the consideration into the relevant standards or by creating new standard(s). 	
<ul style="list-style-type: none"> ▪ Security – Contact IEC/ TC 65 in respect to close cooperation „safety and security“ in order to find common consensus for future proceeding 	
<ul style="list-style-type: none"> ▪ Security – Contact ISO/ TC 199 to start with an amendment of ISO 12100 to implement security as a hazard related to machinery safety 	
<ul style="list-style-type: none"> ▪ New trends (based on e.g. IoT): Setup of an adhoc group in IEC/ TC 44 to collect data and facts 	
<ul style="list-style-type: none"> ▪ The integration of 3D protective equipment into the IEC 61496 series has started with the publication of IEC 61496-4-2 and IEC 61496-4-3. Within maintenance of IEC 61496-3 the scope of the standard will be expanded to 3D and the related requirements and test procedures will be implemented. A new work item proposal to prepare a generic standard for safety related sensors used for protection of persons is accepted by TC 44 and the working group will start to prepare a first draft in September 2015. 	

F Useful links to IEC web site

- [TC 44 dashboard](#) - TC/SC Officers, Scope, Liaisons, WG/MT/PT structure
- Membership
- Publications issued
- Work Programme
- Maintenance programme
- Name or signature of the secretary: **Ben Hedley**