



IEC/TC or SC 40	Secretariat Netherlands	Date 2008-10
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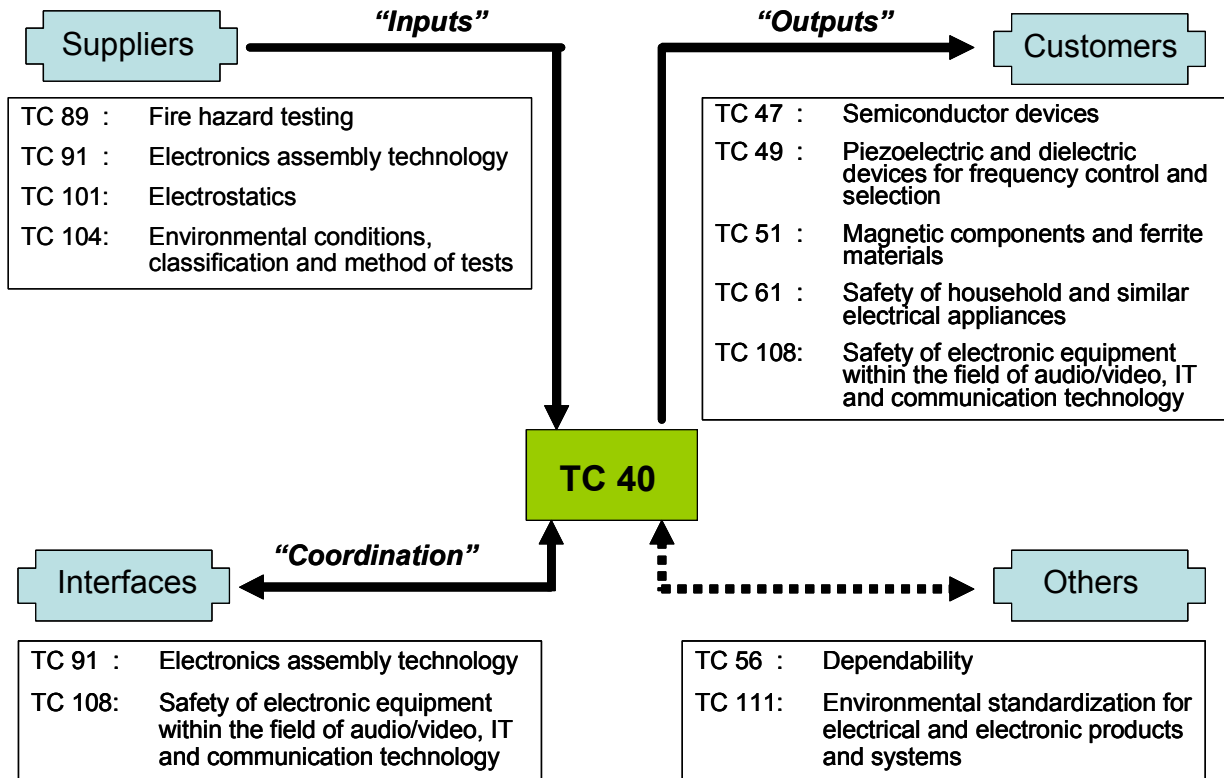
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Title of TC Capacitors and resistors for electronic equipment
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<p><b>A. Background</b></p> <p>TC 40 was established in London in 1954 as the parent committee for electronic components of 5 Subcommittees. In 1961 during the Interlaken meeting this sub-division was given up and most of the existing component committees then started to work as individual committees.</p> <p>TC 40 is responsible for the preparation and maintenance of international standards for: Capacitors, resistors, thermistors and varistors for use in electronic equipment.</p> <ul style="list-style-type: none"><li>b. Capacitors, resistors, inductors and complete filter units for interference suppression.</li><li>c. Passive integrated circuits or networks containing resistors, capacitors, inductors or their combinations.</li><li>d. Packaging of electronic components for automatic handling, which is an activity undertaken on behalf of all relevant component technical committees.</li><li>e. Electric double layer capacitors for use in electrical and electronic equipment</li></ul> <p>TC 40 has the following Working Groups:</p> <p>WG 36: Packaging of components for automatic handling. WG 39: Harmonisation</p> <p>Liaisons:</p> <p>SC 47D: Semiconductor devices TC 61: Safety of household and similar electrical appliances, TC 69: Electric road vehicles and electric industrial trucks TC 91: Electronics assembly technology TC101: Electrostatics TC 108: Safety of electronic equipment within the field of audio/video, information technology and communication technology</p> <p>Members (P): Belgium, China, Finland, France, Germany, Italy, Japan, Korea (Rep. of), Netherlands, Russian Fed., Spain, Sweden, USA, United Kingdom (14)</p> <p>Members(O): Austria, Australia, Bulgaria, Czech Republic, Denmark, Serbia and Montenegro, Hungary, Ireland, India, Malaysia, Norway, Poland, Portugal, Romania, Singapore, Switzerland, Thailand, Ukraine (18).</p>
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## System Approach in IEC Standardization

TC 40: Capacitors and resistors for electronic equipment



### B. Environment

#### B.1 Business environment

There are over 3000 Billion discrete resistors, capacitors and inductors used annually in industry. The increasing use of electronics in all fields of industry supports a continuous growth in the demand of these passive components. During the last 20 years five major technological trends have influenced the development of these components and continue to do so: miniaturisation, automatic assembly of the components, surface mounting technology, the digitalisation of the electronics and request for zero defects. These trends have meant a huge challenge in the development of passive components, which consequently resulted in a continuous need for standards for new component families, updates of existing specifications, appropriate test methods and requirements. Similar activities apply to all styles of packaging of all various components for automatic handling, active as well as passive.

At the same time the prices of these components have declined, in some areas dramatically.

#### B.2 Market demand

The customers of the standards developed by TC 40 are the manufacturers of components, the users of the components [set makers = OEMs (Original Equipment Manufacturers) and EMSs (Electronics Manufacturing Services)], producers of machines for automatic handling and assembly, test houses and certifying bodies (specifically with regard to safety matters).

Although industry is well represented in TC 40, the OEM-, continually growing EMS-, and machine building industries are encouraged to participate more in TC 40 standardization work.

The growth of electronics production is fastest in the Asia/Pacific region. Active participation

(P-membership) by countries from this region is desirable.

In the TC 40 area there is a continuous need for new standards, at the same time the maintenance of existing standards causes a considerable amount of work.

### **B.3 Trends in technology and trade**

The trends given in B.1 continue to affect the work of TC40 in the future. The following developments will require appropriate standardization:

Passive integrated circuits and embedded passives

New dielectric materials in the area of capacitors, new electrolytic materials (e.g. conductive polymer), higher permeability of ferrites for inductors. New capacitor technologies, e.g. Double Layer Capacitors (Super or Ultra Capacitors).

There is an increasing emphasis on environmental issues and restriction on materials used.

Maintenance Teams should take this into account during their deliberations.

The imminent ban on the use of lead (Pb) in electronics has caused huge impact directly (lead in the components) and indirectly (possibly higher process temperatures in the soldering) for the whole component industry, and has been affecting many standards. Maintenance Teams do take this into account during their deliberations.

The move of the production of electronic equipment from the OEMs to subcontracting is ongoing, which means challenge in marketing the standards and the standardization work. Also geographical move especially to China means a great challenge to reach new customers for standards

### **B.4 Ecological environment**

TC 40's main focus is on standards for components as end products, not on manufacturing technologies and materials used. In standards for packaging of components for automatic handling, attention will be paid to minimizing the use of packaging materials as well as to adopting recyclable materials. New energy saving equipment / solutions may generate needs for new types of capacitors or filters and their standards.

## **C. Work programme**

### **C.1 Current work**

The creation of a complete range of standards, for the families of fixed capacitors, fixed linear resistors, thermistors, varistors and potentiometers, inductors and filter units for electromagnetic interference suppression, of components with axial and radial leaded styles as well as surface mount components has been realised.

These standards include procedures and requirements for quality assessment and make them therefore suitable for use in the IECQ system. This covers the performance as well as the safety requirements, where applicable. A new trend to separate Quality Assessment sections from the Product Standards would mean major restructuring of all TC 40 Standards.

To facilitate interchangeability of components for automatic assembly, standards have been published for taping of axial, radial and surface mount components, stick magazines, matrix trays and bulk case.

A considerable part of the present work programme covers maintenance of existing standards.

### **C.2 Resources/infrastructure needed**

Invitations for TC 40 - WG meetings have not been problematic so far.

The safety requirements for components within the TC 40 scope should be dealt with by TC40. Safety standards should refer to the relevant TC 40 documents for these safety requirements.

TC 40 has an official liaison with IEC SC 47D (Semiconductor devices), TC 91 (Electronics assembly technology) and TC 108 (Safety of electronic equipment within the field of audio/video, information technology and communication technology), in order to be mutually informed about the standard development.

A liaison with TC 69 (Electric road vehicles and electric industrial trucks) and TC101 (Electrostatics) will be sought.

**C.3 Safety aspects (only for committees which do not have a reference to safety in their scope)**

**D. Future work**

In the context of the information given in items A, B and C, TC 40 has defined its mission as follows:

To promote the interchangeability and quality performance of capacitors and resistors (as defined in the TC 40 scope, see item A) with international participation of component manufacturers, component users and other interested parties.

To achieve this through the rationalization of terminology, component and quality performance parameters and methods of verification.

Thereby creating a harmonized framework within which equipment manufacturers and procurement agencies, worldwide, can select capacitors and resistors with optimum ease and confidence.

Substantial work will result from the updated working programme.

In specific areas co-operation with equipment / system Technical Committees (e.g. TC69 and TC9) is creating work on application specific standards.

New developments in assembly technology will have to be monitored in close liaison with TC 91 to ensure that TC 40 standards adequately reflect these developments in industry.

A further challenge will be for all component committees to participate in the development of standards for Electronic Data Interchange (EDI) of electronic component data for use in electronic databases, CAD-libraries etc. This subject will require some particular attention in close liaison with e.g. SC 3D and TC 93, in view of the apparent lack of insight in the particular requirements of these quickly developing application areas.

**E. Maintenance cycle (See separate overview)**

Publication no.	Date of publication	Maintenance result date	Review date	Comments
IEC 60062/Ed.5	Nov-04	2011	2010	
IEC 60063/Ed.2	1963	2011	2010	
IEC 60115-1/Ed.4	2001		2011	
IEC 60115-2/Ed.2	1982	2009	2008	
IEC 60115-2-1/Ed.1	1982	2010	2009	
IEC 60115-2-2/Ed.1	1992	2010	2009	
IEC 60115-4/Ed.2	1982	2010	2009	
IEC 60115-4- 1 /Ed.1	1983	2011	2010	
IEC 60115-4- 2	1992	2011	2010	
IEC 60115-4- 3/Ed.1	1993	2011	2010	
IEC 60115-4-101/Ed.1	1995	2011	2010	
IEC 60115-4-102/Ed.1	1995	2011	2010	
IEC 60115-5/Ed.2	1982	2013	2012	
IEC 60115-5- 1 /Ed.1	1983	2014	2013	
IEC 60115-5- 2/Ed.1	1992	2014	2013	
IEC 60115-5-101/Ed.1	1995	2014	2013	
IEC 60115-6/Ed.1	1983	2011	2010	
IEC 60115-6- 1/Ed.1	1983	2011	2010	
IEC 60115-6- 2/Ed.1	1983	2011	2010	
IEC 60115-6-101/Ed.1	1992	2011	2010	
IEC 60115-6-102/Ed.1	1992	2011	2010	
IEC 60115-7/Ed.1	1984	2011	2010	

IEC 60115-7-1/Ed.1	1984	2011	2010	
IEC 60115-8/Ed.1	1989			Ed.2 to be publ. 2008 with MRD 2011
IEC 60115-8-1/Ed.1	1989	2009	2008	
IEC 60115-9/Ed.1	2003	2010	2009	
IEC 60115-9-1/Ed.1	2003	2011	2010	
IEC 60190/Ed.2	1966			To be withdrawn in 2009
IEC 60195/Ed.1	1965	2010	2009	
IEC 60286-1/Ed.2	1997	2012	2011	
IEC 60286-2/Ed.2.1	2003	2011	2010	
IEC 60286-3/Ed.3	2007	2010	2009	
IEC 60286-3-V				Ed.4 to be publ. 2008 with MRD 2010
IEC 60286-3-VI				Ed.4 to be publ. 2008 with MRD 2010
IEC 60286-4/Ed.2	1997	2010	2009	
IEC 60286-5/Ed.2	2003			Ed.3 to be publ. 2008 with MRD 2012
IEC 60286-6/Ed.2	2004	2010	2009	
IEC 60294/Ed.1	1969	2009	2008	
IEC 60301/Ed.2	1971	2009	2008	
IEC 60384- 1/Ed.3	1999			Ed.4 to be publ. 2008 with MRD 2011
IEC 60384- 2/Ed.3	2005	2009	2008	
IEC 60384- 2-1/Ed.2	2005	2010	2009	
IEC 60384- 3/Ed.3	2006	2012	2011	
IEC 60384- 3- 1/Ed.2	2006	2013	2012	
IEC 60384- 3-101/Ed.1	1995	2013	2012	
IEC 60384- 4/Ed.4	2007	2012	2011	
IEC 60384- 4-1/Ed.3	2007	2013	2012	
IEC 60384- 4-2/Ed.2	2007	2013	2012	
IEC 60384- 6/Ed.3	2005	2009	2008	
IEC 60384- 6-1/Ed.2	2005	2009	2008	
IEC 60384- 8/Ed.3	2005	2011	2010	
IEC 60384- 8-1/Ed.2	2005	2012	2011	
IEC 60384- 9/Ed.3	2005	2011	2010	
IEC 60384- 9-1/Ed.2	2005	2012	2011	
IEC 60384-11/Ed.2	2008	2011	2010	
IEC 60384-11-1	2008	2012	2011	
IEC 60384-12	1988	2009	2008	
IEC 60384-12-1/Ed.1	1988	2009	2008	
IEC 60384-13/Ed.3	2006	2009	2008	
IEC 60384-13-1/Ed.2	2006	2010	2009	
IEC 60384-14/Ed.3	2005			Ed.4 to be publ. 2009 with MRD 2013
IEC 60384-14-1/Ed.2	2005	2010	2009	
IEC 60384-14-2/Ed.1	2004	2010	2009	
IEC 60384-14-3/Ed.1	2004	2010	2009	
IEC 60384-15/Ed.1	1982	2009	2008	
IEC 60384-15-1/Ed.1	1984	2010	2009	
IEC 60384-15-2/Ed.1	1984	2010	2009	
IEC 60384-15-3/Ed.1	1984	2010	2009	
IEC 60384-16/Ed.2	2005	2010	2009	
IEC 60384-16-1/Ed.2	2005	2011	2010	
IEC 60384-17/Ed.2	2005	2010	2009	
IEC 60384-17-1/Ed.2	2005	2011	2010	
IEC 60384-18/Ed.2	2007	2012	2011	
IEC 60384-18-1/Ed.2	2007	2013	2012	
IEC 60384-18-2/Ed.2	2007	2013	2012	
IEC 60384-19/Ed.2	2006	2011	2010	
IEC 60384-19-1/Ed.2	2006	2012	2011	
IEC 60384-20/Ed.1	2008	2011	2010	
IEC 60384-20-1/Ed.1	2008	2012	2011	
IEC 60384-21/Ed.1	2004	2009	2008	

IEC 60384-21-1/Ed.1	2004	2010	2009	
IEC 60384-22/Ed.1	2004	2009	2008	
IEC 60384-22-1/Ed.1	2004	2010	2009	
IEC 60384-23/Ed.1	2006	2011	2010	
IEC 60384-23-1/Ed.1	2006	2012	2011	
IEC 60384-24/Ed.1	2006	2011	2010	
IEC 60384-24-1/Ed.1	2006	2012	2011	
IEC 60384-25/Ed.1	2006	2011	2010	
IEC 60384-25-1/Ed.1	2006	2012	2011	
IEC 60393-1/Ed.3	1989		2013	
IEC 60393-2/Ed.2	1989	2009	2008	
IEC 60393-2- 1/Ed.1	1989	2010	2009	
IEC 60393-2- 2/Ed.1	1992	2010	2009	
IEC 60393-2-101/Ed.1	1994	2012	2011	
IEC 60393-3/Ed.2	1992	2011	2010	
IEC 60393-3-1/Ed.1	1992	2012	2011	
IEC 60393-4/Ed.2	1992	2011	2010	
IEC 60393-4-1/Ed.1	1992	2012	2011	
IEC 60393-4-2/Ed.1	1992	2012	2011	
IEC 60393-5/Ed.2	1992	2009	2008	
IEC 60393-5-1/Ed.1	1992	2010	2009	
IEC 60393-5-2/Ed.1	1992	2010	2009	
IEC 60393-6/Ed.1	2003	2009	2008	
IEC 60393-6-1/Ed.1	2003	2010	2009	
IEC 60418-1/Ed.1	1974	2009	2008	
IEC 60418-2/Ed.1	1976	2010	2009	
IEC 60418-2A/Ed.1	1980	2010	2009	
IEC 60418-2B/Ed.1	1980	2010	2009	
IEC 60418-3/Ed.1	1976	2010	2009	
IEC 60418-3A/Ed.1	1980	2010	2009	
IEC 60418-4/Ed.1	1976	2010	2009	
IEC 60418-4A/Ed.1	1980	2010	2009	
IEC 60425/Ed.1	1973	2009	2008	
IEC 60539-1/Ed.1	2008	2013	2012	
IEC 60539-2/Ed.1	2003	2009	2008	
IEC 60717/Ed.1	1981	2009	2008	
IEC 60738-1/Ed.3	2006			Ed.4 to be publ. 2009 with MRD 2013
IEC 60738-1-1/Ed.2	2008	2011	2010	
IEC 60738-1-2/Ed.1	2008	2011	2010	
IEC 60738-1-3/Ed.1	2008	2011	2010	
IEC 60738-1-4/Ed.1	2008	2011	2010	
IEC 60915/Ed.2	2006	2012	2011	
IEC 60938-1/Ed.2.1	2006	2011	2010	
IEC 60938-2/Ed.2.1	2006	2012	2011	
IEC 60938-2-1/Ed.1	1999	2012	2011	
IEC 60938-2-2/Ed.1	1999	2012	2011	
IEC 60939-1/Ed.1	2005			Ed.3 to be publ. 2009 with MRD 2012
IEC 60939-2/Ed.2	2005	2009	2008	
IEC 60939-2-1/Ed.1	2004	2010	2009	
IEC 60939-2-2/Ed.1	2004	2010	2009	
IEC 60940/Ed.1	1988			Amend. to be publ. 2009 with MRD 2010
IEC 61045-1 /Ed.1	1991	2012	2011	
IEC 61045-2/Ed.1	1991	2012	2011	
IEC 61045-2-1/Ed.1	1991	2012	2011	
IEC 61051-1/Ed.2	2007	2011	2010	
IEC 61051-2/Ed.1	1991			Ed.2 to be publ. 2009 with MRD 2014
IEC 61051-2-2/Ed.1	1991	2010	2009	

IEC 62319-1/Ed.1	2005	2009	2008	
IEC 62319-1-1/Ed.1	2005	2010	2009	
IEC 62391-1/Ed.1	2006	2010	2009	
IEC 62391-2/Ed.1	2006	2011	2010	
IEC 62391-2-1/Ed.1	2006	2012	2011	
IEC 62490-1/				Ed.1 to be publ. 2009 with MRD 2014
IEC 62490-2/				Ed.1 to be publ. 2009 with MRD 2014
IEC/TR 60440/	1973	2009	2008	

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