TC40XB/0480/sec/REP

BUSINESS PLAN

CENELEC/TC or SC	Secretariat	Date
TC 40XB	Germany	2023-04-19

TC or SC title: RESISTORS

A Background

A.1 General

CLC/TC 40XB prepares and maintains European Standards in the field of fixed and variable resistors and networks for use in electronic equipment. A particular focus is placed on the aim to combine up-to-date market needs with significant and discriminative requirements and the standard's suitability for use within a quality assessment system for electronic components (CECC and successors). CLC/TC 40XB maintains a close liaison with the IEC TC40, and also observes the work of other relevant technical committees, like e.g. IEC/TC 91, or TC 104.

The European standardisation of resistors for use in electronic equipment started in one of the first working groups of the former CENELCOM committee, which had been founded in 1959, just two years after the inauguration of the European Economic Community. This was succeeded in early 1973 by the newly founded CENELEC, where the tasks of component standardisation were executed by the CENELEC Electronic Components Committee (CECC) and its various working groups, including CECC Working Group 4: Resistors. Later this had been split into WG 4A for fixed resistors, and WG 4B for variable resistors. Then at the start of 1995, the CECC has been fully integrated into the organization of CENELEC, thereby subsequently carrying over the former working groups to new Technical Committees, e.g. CECC Working Group 4a into the new TC 40XB: Resistors. Finally, in 2003, the CECC Quality assessment system has been merged into the IECQ System.

A.2 Sustainable development goals

- ☐ GOAL 1: No Poverty
- ☐ GOAL 2: Zero Hunger
- ☐ GOAL 3: Good Health and Well-being
- ☐ GOAL 4: Quality Education
- ☐ GOAL 5: Gender Equality
- ☐ GOAL 6: Clean Water and Sanitation
- ☒ GOAL 7: Affordable and Clean Energy
- ☒ GOAL 8: Decent Work and Economic Growth
- ☒ GOAL 9: Industry, Innovation and Infrastructure
- ☐ GOAL 10: Reduced Inequalities
- ☐ GOAL 11: Sustainable Cities and Communities
- ☒ GOAL 12: Responsible Consumption and Production
- ☐ GOAL 13: Climate Action
- ☐ GOAL 14: Life Below Water
- ☐ GOAL 15: Life on Land
- ☐ GOAL 16: Peace, Justice and Strong Institutions
- ☐ GOAL 17: Partnerships to achieve the Goal
- ☐ None of the above

SDG 7: Affordable and Clean Energy – (Energy, the golden thread)

TC 40XB documents are specifically adapted or created to meet the requirements in Solar converters, in electric vehicle power lines and in charging infrastructure. The documents make the production of safe end products possible and e.g. enable the smooth functioning of electric vehicle drives.

SDG 8: Decent Work & Economic Growth – (Safety of workers and economic growth)

The passive electronic components which are standardized by TC 40XB are essential components in all electronic equipment e.g. in computer hardware, television and radio. The TC 40XB safety standards are the basis to protect workers from electrical failures in equipment and to minimize the EMI disturbances.

SDG 9: Industry, Innovation & Infrastructure – (Resilient infrastructure and sustainable industrialization)

TC 40XB projects promote new technologies and methods, fostering the reduction of resource consumption, e.g. by miniaturization. In that context continuous reduction of waste and replacement of hazardous material is achieved

SDG 12: Responsible Consumption & Production

TC 40XB projects target an increase of production efficiency by automation and support related knowledge and technology transfer. The documents created contain quality requirements and assessment procedures, which increase equipment reliability and provide guidance, how to prevent quality losses and creation of waste by defects caused by the wrong application of electronic components.

A.3 Management structure of the committee

All activities are addressed within the whole of TC 40XB, there are no working groups. Project leaders step up as required.

B Business Environment

B.1 General

According to trade statistics, the global annual demand of passive components, e.g. resistors, capacitors and inductors, in 2020 has been around 4000 Billion pieces, representing a value of about 28 Billion EUR. In this picture resistors had a volume share of 40 % but represented only 10 % of the global value.

The production of resistors is globally spread, where the high-mass production of low-specified products predominantly is in Asian low-cost countries, while resistors with higher design complexity, superior specification level and formal quality conformance are more likely produced in Europe, in North America, or in Japan.

The business with resistors is global but is not evenly spread in terms of volume and value: While 75 % of the volume reportedly is traded in Asian low-cost producing countries, this represents only 50 % of the global value. On the other side, Europe reportedly consuming only 10 % of the global volume involves about 18 % of the value.

One key to such significant difference is to be seen in the different levels of performance and reliability requirements imposed by the individual application market segments, which have a significant influence on the global spread of component use.

- For example, consumer, computing and connectivity electronics are typically operated in benign environments, are typically not subjected to noteworthy electrical stress, and usually are not vested with significant lifetime expectancy - such electronics is designed anywhere, but almost exclusively manufactured in Asian low-cost producing countries.

- Other examples involve harsh environmental and electrical stress for lifetime demands in excess of ten years, like found e.g. in automotive electronics, often accompanied by the prerequisite of indisputable reliability (e.g. electronics for aerospace) – professional electronics of which a predominant share is developed and designed in Europe, for assembly evenly spread between Europe and Asia.

Hence the impact of European development and design work reaches far beyond the geographical boundaries of Europe and features an additional momentum on the demand of components with superior qualification and thus representing superior commercial value.

B.2 Market demand

Publications developed by CLC/TC 40XB are used by a wide variety of stakeholders, not limited to their geographical focus being situated in Europe:

- Resistor manufacturers, who appreciate the availability of a common and harmonized definition of their products as an opener to design-in opportunities, the definition of standard component outlines as a key for the automated assembly, and the defined set of tests and requirements as a standard platform for the communication of performance and reliability data with their customers.

  Above that, some manufacturers achieve and maintain certifications to the relevant standards and specifications, which could be seen as a marketing instrument intended to demonstrate the quality and reliability of their products under independent assessment, but also as a driving momentum for the continued improvement of their quality management system.

- Resistor users, in their plenty functional responsibilities,
  - like circuit designers, who appreciate a comprehensive description of device properties along with detailed stability data permitting responsible lifetime predictions;
  - like QA managers, who benefit from the availability of qualified components, but also from readily available test schedules and from respective test data provided by the component manufacturer;

- like specification writers, who benefit from reasonably graduated ratings, meaningful choice of tests and respective severities.

- Trading partners, who appreciate a generic description of resistors in order to categorize the variety of marketed products and their individual and sometimes inconsistent descriptions.

- Certification bodies and others involved with conformity assessment, who require detailed and consistent test schedules with suitable ratings, prescriptions and requirements in order to conclude on compliance and to assess the component's reliability.

- Logistics agencies, who require the prescription of a limited subset from the wide variety of possible options, together with a clear definition of a part identification code for use in a globally effective supply items database.

Although a few other resistor standards exist in some regions, none of them is known to compete with the harmonised documents of combined IEC/TC 40 and CENELEC CLC/TC 40XB origin in terms of discrimination of relevant types, consistency of ratings and prescriptions, and up-to-date relevance of implemented test requirements.

B.3 Trends in technology

As a general trend, the use of electronics is ever increasing, and so is the use of passive components, and particularly of resistors. For longer time there has been a constant drive for miniaturisation of the appliance, and the need for automation of the assembly process. The result is the predominant SMD technology and a continuous challenge for smaller package sizes. Comparably more recent developments are the uses of new assembly technologies, like e.g. conductive glue replacing the solder joint where its reliability is feared to be insufficient or attempts of embedding components into the printed circuit board and in general the expectation for a decreased level of initial failures, addressed as "zero defect" policy.

Emerging new markets impose needs for new components which require higher levels of performance specification than traditionally established components.

This has become obvious in the field of renewable energies, like solar power or wind power, and the smart grid, where for measuring and control functions at high voltages the reliability is indispensable, regardless of the prevailing environmental stresses and very long lifetime expectancy. Other evidence arises from developments in electro-mobility, which in addition to the ubiquitous requirements for robustness against unparalleled levels of dynamic environmental stress, now calls for outstanding precision and stability, and also for superior robustness against electrical stress.

B.4 Market trends

The growth of the electronics industry has gone on for a long time now, with no predictable end. However, the total market is volatile, with seemingly uncoordinated patterns for individual market segments. Common for all market segments is a pressure to decrease the lead-times for passive components, which however contrasts the steady and much longer typical lead-times of many other components.

Along with this goes a growth of the demand for passive components, in which however the spread between resistors, capacitors and inductors faces some change over time. While some years ago still about 80 % of a PCB population was resistors, this share decreases with the continuing digitalization particularly of the consumer, computing and connectivity electronics.

While the past has been dominated by the move of electronics production to Asian low-cost producing countries, now increased activities involving challenging design, e.g. in the field of electromobility can be observed. This follows the notable increase of design competence in Asian countries.

B.5 Ecological environment

The use of hazardous substances in resistors, including their manufacturing, assembly and application is generally governed by RoHS and REACH directives. Impacts of such regulations and of changes thereof are reflected in the work of CLC/TC 40XB as required and in due time.

Aside of such detailed technical relevance there is a general obligation to all industries to implement and to comply with an environmental management system according to ISO 14001. It is however not common of such comprehensive scheme to have a particular impact down to technical details on a component level.

The work of CLC/TC 40XB is not impacted by an EC Mandate.

B.6 Involvement of societal stakeholders

CLC/TC 40XB consists of delegates from the National Committees, which are the members of CENELEC.

The National Committees in turn gather representatives from all interested parties, which may include societal stakeholders if it was deemed suitable.

B.7 Involvement of SMEs

CLC/TC 40XB consists of delegates from the National Committees, which are the members of CENELEC.

The National Committees in turn gather representatives from all interested parties, particularly from manufacturers and users of resistors side by side, which may be large enterprises or SMEs likewise. Therefor the NC delegates are to represent a fair share of presented SME interest in their consolidated National position.

Actual participation on a National Committee level however depends on the willingness of each interested party, be it manufacturer or user, and be it enterprise or SME, to make an individual person available and to bear the incidental expenses.

C System approach aspects

The work of CLC/TC 40XB relies to a great extent on the results of IEC TC40, to which it maintains a close liaison, which is supported by means of double delegation of most National delegates to both, CLC/TC 40XB and IEC/TC 40.

As standardisation on resistors depends on a variety of general standards established by other specific committees, like e.g. IEC/TC 91 on electronics assembly technology, IEC/TC 101 on electrostatics, or IEC/TC 104 on environmental conditions and methods of test, CLC/TC 40XB itself closely observes the work of these committees in order to adopt whatever new relevant references may come into its work in due time, without any delay through processing subsequent to IEC/TC 40 only.

CLC/TC 40XB attaches high significance on the applicability of their standards within the framework of a comprehensive and suitable quality assessment system. Such suitable QA system is the adoption of the former CECC quality assessment system for electronic components into the IECQ after its disbanding at CENELEC.

D Objectives and strategies (3 to 5 years)

The objective of CLC/TC 40XB is to provide resistor makers, users and other interested parties with up-to-date standards and specifications of resistors, which combine a summary of relevant performance and stability requirements with a zero-defect test methodology.

This includes providing a demanding and discriminative basis for a quality assessment scheme, which is capable to allow resistor makers and users to save efforts compared to uncoordinated specification and test work.

This is to be achieved by:

- Executing global harmonisation of standards, following the IEC/TC 40 results;
- Supporting feedback of high-level market requirements towards standards and specifications to IEC/TC 40 project teams through the NC delegates;
- Reducing the maintenance backlog of outdated home-grown specifications, e.g. of CECC origin.

E Action plan

CLC/TC 40XB continuously monitors the work and results of IEC TC40 in the field of resistors in order to prepare the grounds for the subsequent adoption of the respective IEC International Standards as a European Standard in line with the Frankfurt Agreement between IEC and CENELEC. This includes the preparation of Common Modifications, wherever required for the use of these European EN Standards for the purpose of Quality Assessment. Such newly emerging International Standard, or new revision thereof, possibly succeeds a prior European Standard or CECC specification.

CLC/TC 40XB continuously monitors the work and results of other relevant Technical Committees, such as IEC TC 91, TC 101, or TC 104, who's International Standards are applied within the scope of CLC/TC 40XB. Changes resulting from a new release of a relevant document will be investigated in the context of all CLC/TC 40XB deliverables, published or in progress, in order to initiate respective actions as required.

CLC/TC 40XB continuously drives the harmonization of standards in the field of resistors by promoting the migration of relevant issues from standards or specifications with historical background to the level of current European Standardisation, and by promoting the withdrawal of historical standards or specifications without current relevance. The affected range of standards or specifications exceeds those documents registered in the CENELEC databases, as it embraces also the portfolios within National Committee responsibilities.

F Digital transformation aspects

The concept of sectional blank detail specifications can be used for a modular approach in the digitalization of standards.

G Useful links to CENELEC web site

TC home page giving access to Membership, TC/SC Officers, Scope, Publications, Work programme [password-protected area].

On the CENELEC home page (www.cenelec.eu), passing along »Standards Development«, then »List of Technical Bodies« and finally »CLC/TC 40XB«, leads to a section showing significant details on the committee CLC/TC 40XB, such as:

- Scope with secretariat, CCMC programme manager and business plan
- Structure, with CLC/TC40XB officers
- Documents, with working documents
- Meetings, last and next meetings
- Collaboration Tools, leading to Collaboration Platform and EMS (only by “login”)

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