



IEC TC 107: your strategic tool in
process management for avionics

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Your company needs to:

- Develop, document, and implement processes to manage electronic components that meet the requirements of the avionics industry (quality, reliability, safety, ...) while the electronics industry is dominated by high-volume applications, rapid change, obsolescence and lifetime problems.

IEC Technical Committee (TC) 107 has a major role to play in developing standard processes to use and manage these components, equipments, and systems in avionics applications. Participating in the work of IEC TC 107 can help you tackle issues such as atmospheric radiation requirements or lead-free transition.

Standards developed by IEC TC 107 are used by aerospace equipment manufacturers to satisfy requirements from aerospace customers, and to aid in the aerospace certification process.



The work of IEC TC 107

IEC TC 107 was set up in 2001 to develop process management International Standards on systems and equipment used in the field of avionics. Avionics comprises electronics used in commercial, civil and military aerospace applications, requiring particularly high reliability level and long life duration.

Most IEC TC 107 Standards can also be implemented in defence and other high performance applications.

Twenty-two IEC national committees (NCs) take part in the work of IEC TC 107:

- Seven participating or P-members: Brazil, China, France, Israel, Japan, the UK and the US
- Fifteen observers or O-members: Belgium, Czech Republic, Denmark, Finland, Germany, Greece, Italy, Korea (Republic of), Mexico, Netherlands, Norway, Russian Federation, Spain, Sweden and Switzerland

How Standards are prepared

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The IEC TC 107 working groups (WGs) prepare technical documents in the field of process management for avionics, which are then submitted to NCs for voting with a view to their approval as International Standards.

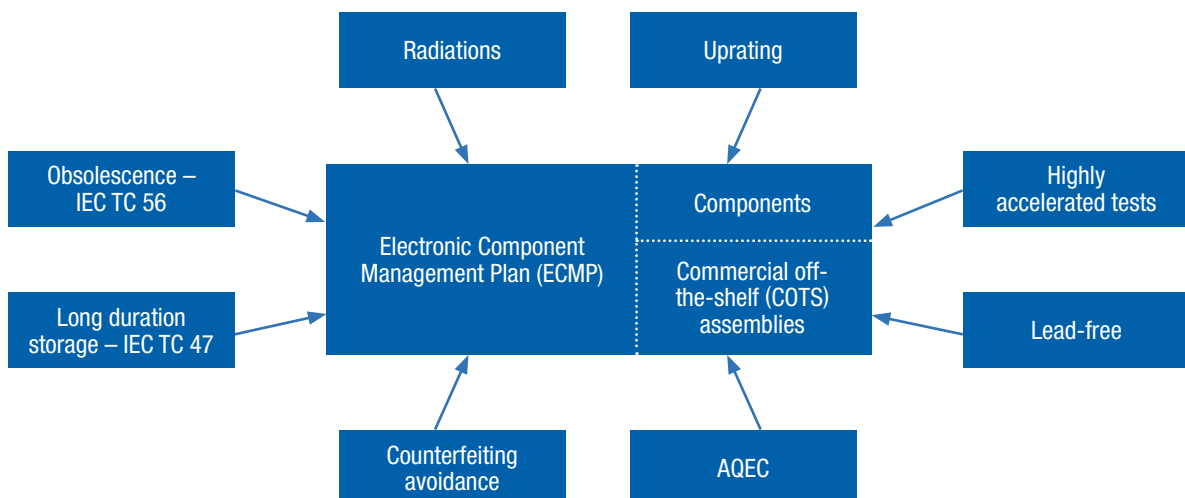
Experts from P-members are involved in the work of several IEC TC 107 working groups:

- Maintenance Team 2 (MT 2): Components capability – Temperature uprating (IEC 62240 series)
- Working Group 1 (WG 1): Aerospace and defence electronic systems containing lead-free solder (IEC 62647 series)
- Working Group 2 (WG 2): Aerospace qualified electronic component (AQEC) (IEC 62564 series and IEC 62686 series)

- Working Group 3 (WG 3): Counterfeit electronic parts; avoidance, detection, mitigation, and disposition in avionics applications (IEC 62668 series)
- Working Group 4 (WG 4): Accommodation of atmospheric radiation effects via single event effects within avionics electronic equipment (IEC 62396 series)
- Working Group 5 (WG 5): Management plans (IEC 62239 series)

All IEC Standards are subject to a maintenance cycle appropriate to the technology evolution. New topics can be considered with regards to the market and technologies trends.

For example, in view of the increasing problems caused by the counterfeiting of electrical and electronic components, equipment and systems, IEC TC 107 develops technical specifications to give requirements



Particular processes are developed in correlation to support the Electronic Component Management Plan (ECMP) development: radiative environment, lead-free transition, obsolescence, and so forth.

and guidance for the development of a management plan to avoid the use of counterfeit electronic parts in avionic applications. Counterfeiting prevention in a developing worldwide electronic component market is essential for avionics applications, with regards to reliability and safety requirements.

On the other hand, advanced submicron electronics and now deep submicron electronics (lithography size lower than 100 nm) can lead to new failure mechanisms and degradation modes affecting potentially reliability and wear out of electronic components. They can also suffer data corruption or malfunction even at sea level due to the effects of secondary atmospheric radiation neutrons produced in the interaction between the atmosphere and cosmic rays that originate beyond earth. At the cruise altitude of modern airliners the flux of secondary atmospheric radiation neutrons is about 300 times that which it is at sea level. The market demands that avionics electronics must be able to meet its application requirements at these altitudes and IEC TC 107 develops technical specifications and Standards to accommodate the atmospheric radiation effects.

IEC TC 107 published Standards (as of March 2018)

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- IEC TS 62239-1, *Process management for avionics – Management plan*
 - *Part 1: Preparation and maintenance of an electronic components management plan*
 - *Part 2: Preparation and maintenance of an electronic COTS assembly management plan*
- IEC TR 62240, *Process management for avionics – Electronic components capability in operation*
 - *Part 1: Temperature uprating*

- *Part 2: Semiconductor microcircuit lifetime* (under development)
- IEC 62396, *Process management for avionics – Atmospheric radiation effects*
 - *Part 1: Accommodation of atmospheric radiation effects via single event effects within avionics electronic equipment*
 - *Part 2: Guidelines for single event effects testing for avionics systems*
 - *Part 3: System design optimization to accommodate the single event effects (SEE) of atmospheric radiation*
 - *Part 4: Design of high voltage aircraft electronics managing potential single event effects*
 - *Part 5: Assessment of thermal neutron fluxes and single event effects in avionics systems*
- IEC TR 62396, *Process management for avionics – Atmospheric radiation effects*
 - *Part 6: Extreme space weather – Potential impact on the avionics environment and electronics*
 - *Part 7: Management of single event effects (SEE) analysis process in avionics design*
 - *Part 8: Assessment of proton, electron, pion, muon fluxes and single event effects in avionics systems* (under development)

- IEC TS 62500, *Process management for avionics – Defining and performing highly accelerated tests in aerospace systems – Application guide*
- IEC TS 62564-1, *Process management for avionics – Aerospace qualified electronic components (AQEC) – Part 1: Integrated circuits and discrete semiconductors*
- IEC TS 62647, *Process management for avionics – Aerospace and defence electronic systems containing lead-free solder*
 - *Part 1: Preparation for a lead-free control plan*
 - *Part 2: Mitigation of deleterious effects of tin*



- *Part 3: Performance testing for systems containing lead-free solder and finishes*
- *Part 4: Ball grid array (BGA) package reballing* (under development)
- *Part 21: Program management – Systems engineering guidelines for managing the transition to lead-free electronics*
- *Part 22: Technical guidelines*
- *Part 23: Rework and repair guidance to address the implications of lead-free electronics and mixed assemblies*
- IEC TS 62668, *Process management for avionics – Counterfeit prevention*
 - *Part 1: Avoiding the use of counterfeit, fraudulent and recycled electronic components*
 - *Part 2: Managing electronic components from non-franchised sources*



IEC TS 62686-1, *Process management for avionics – Electronic components for aerospace, defence and high performance (ADHP) applications – Part 1: General requirements for high reliability integrated circuits and discrete semiconductors*

IEC PAS 62686-2, *Process management for avionics – Electronic components for aerospace, defence and high performance (ADHP) applications – Part 2: General requirements for passive components*

Work in progress

IEC TC 107/WG 4 is starting to develop additional documents and is doing a complete review of all the series of documents dealing with atmospheric radiation effects on avionics.

Publications from other IEC TCs

Two IEC TCs have developed publications that are relevant to the work of IEC TC 107.

- IEC TC 47: Semiconductor devices
IEC 62435, *Electronic components – Long-term storage of electronic semiconductor devices*
- IEC TC 56: Dependability
IEC 62402, *Obsolescence management – Application guide*

Other IEC TCs are interested in adopting and using IEC TC 107 Standards in completely different fields; an example of such a publication is IEC TS 62239-1 frequently mentioned for providing a valuable aid in the certification process.

Make your voice heard, find answers to your needs, and get involved in IEC TC 107 activities

Join the experts in IEC TC 107, participate in and have an influence on Standards development work. By doing so you are at the forefront in the development of strategic tools in process management for avionics.

Contact your national committee now. The complete list of IEC Member countries is available on the IEC website at: www.iec.ch.

If your national committee is not involved in IEC TC 107 work, contact the IEC Central Office in Geneva at info@iec.ch to find out how you can join IEC TC 107.

About the IEC

The IEC, headquartered in Geneva, Switzerland, is the world's leading publisher of International Standards for electrical and electronic technologies. It is a global, independent, not-for-profit, membership organization (funded by membership fees and sales). The IEC includes 170 countries that represent 99% of world population and energy generation.

The IEC provides a worldwide, neutral and independent platform where 20 000 experts from the private and public sectors cooperate to develop state-of-the-art, globally relevant IEC International Standards. These form the basis for testing and certification, and support economic development, protecting people and the environment.

IEC work impacts around 20% of global trade (in value) and looks at aspects such as safety, interoperability, performance and other essential requirements for a vast range of technology areas, including energy, manufacturing, transportation, healthcare, homes, buildings or cities.

The IEC administers four Conformity Assessment Systems and provides a standardized approach to the testing and certification of components, products, systems, as well as the competence of persons.

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IEC International Standards represent a global consensus of state-of-the-art know-how and expertise



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Key figures

170

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>200

Technical committees and subcommittees

20 000

Experts from industry, test and research labs, government, academia and consumer groups

10 000

International Standards in catalogue

4

Global Conformity Assessment Systems

>1 million

Conformity Assessment Certificates issued

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Years of expertise

Further information

Please visit the IEC website at www.iec.ch for further information. In the "About the IEC" section, you can contact your local IEC National Committee directly. Alternatively, please contact the IEC Central Office in Geneva, Switzerland or the nearest IEC Regional Centre.

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