IEC Quality Assessment System for Electronic Components (IECQ System)

Procedures for the development, publication and maintenance of Specifications (Component/Process) used within the IECQ System
IECQ OPERATIONAL DOCUMENT

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Procedures for the development, publication and maintenance of Specifications (Component/Process) used within the IECQ System

INTERNATIONAL ELECTROTECHNICAL COMMISSION
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FOREWORD

This publication has been prepared by the Management Committee of the IECQ to provide guidance on the development of specifications for use in the IECQ System.

Document History

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<tr>
<th>Document</th>
<th>Report on Approval</th>
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<tbody>
<tr>
<td>IECQ MC/301/CD</td>
<td>IECQ MC/304/DL</td>
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Address:

IECQ Secretariat c/o IEC Sydney Office
The Executive Centre
Australia Square, Level 33
264 George Street
Sydney NSW 2000
Australia

Contact details:

Tel: +61 2 4628 4690
Fx: +61 2 4627 5285
info@iecq.org
www.iecq.org
INTRODUCTION

In any quality assessment system a certain number of documents are necessary so that products may be approved. The nature of the documents is prescribed by the rules governing the specific system. For the IEC Quality Assessment System for Electronic Components (IECQ), the required documents are specified in IECQ 01, Basic Rules and IECQ 03, Rules of Procedure, and in the specifications against which the components or process are certified as part of an overall structure.

While in many cases International Standards and Specifications like IEC, ISO, JEDEC, etc., cover minimum specifications for components, there exists a need to address the many number of situations for which published Standards and Specifications do not exist, hence the need for a systematic process for the creation and use of specifications developed by agreement between the IECQ Certification Body and the organization/company seeking IECQ Certification.

This Operational Document provides procedures for the creation of specifications that may be considered as either:

a) a specification that may be used throughout industry and regarded as a “publicly accessible” specification, or
b) a specification used solely by an organization and containing proprietary detail and hence regarded as a “proprietary” specification and not publicly available.
Procedures for the development, publication and maintenance of Specifications (Component/Process) used within the IECQ System

1 Scope

This Operational Document outlines the principles for the creation, maintenance and availability of specifications for use within the IECQ System to address requirements for Component/Process/Product Specification (CS) and those associated with Assessment to the Specification Assessment Specification (AS), in order to provide for:

- greater flexibility with the possibility of application specific approaches;
- consistency in the specifications issued and used within the IECQ System;
- coverage of components and processes for which International Standards do not yet exist.

Component Specifications and related Assessment Specifications may be prepared for all components covered by the IECQ System for which an IEC or ISO International Standard, or generic (and, if appropriate, sectional) specification or a Technology Approval Schedule (TAS) exists, however in such cases, these specifications shall not be in conflict with the minimum requirements of the IEC or ISO International Standard. Annex A provides the template that must be used as a cover page for the CS. Annex B provides guidance for the preparation of a CS to cover component grouping of the one family.

2 Normative references

The following publications contain provisions, which, through reference in this text, constitute provisions of this document. At the time of publication, the editions indicated were valid. The IECQ Management Committee shall decide the timetable for the introduction of revised editions of the publications.

IECQ 01, IEC Quality Assessment System for Electronic Components (IECQ System) – Basic Rules

ISO/IEC 17000, Conformity assessment – Vocabulary and general principles

In the event of conflict between the provisions of this document and any other directly or indirectly referenced provisions, the provisions of this document shall take precedence.

3 Terms and definitions

The basic definitions concerning conformity assessment contained in ISO/IEC 17000 apply.

3.1 Component Specification (CS)

A specification defining those features (for example dimensions, parameters, characteristics, mechanical, environmental conditions and any subcontracting process arrangements) which are required to be inspected and tested to ensure fitness for purpose, including the Quality Conformance Test Schedule

NOTE For the purpose of this Operational Document “Component” covers specific electronic component items, e.g. materials, discrete and active components as well as items related to a process.
3.2 Quality Conformance Test Schedule (QCTS)
a schedule prescribing the test items, sampling plans, acceptable quality levels, reference to
applicable inspection procedures and test methods together with the sequence and periodicity
of tests required to verify the item

4 General considerations relating to Specifications

In line with the IECQ Basic Rules the official language of the IECQ is English. Therefore an
English version of all Specifications prepared according to this Operational Document shall be
available.

4.1 Purpose of Specifications

To facilitate technical comparison of electronic components, assemblies, related materials, or
processes for the determination of their performance against specified requirements, to assist
in negotiations between component manufacturers, equipment manufacturers and equipment
users and to permit the assessment of the quality (and therefore indirectly the component
reliability), it is desirable to include the following information in these documents:

- a description of the component, which includes electrical, mechanical and environmental
  ratings* and characteristics;
- the procedures to be followed to ensure conformance with the requirements (for example
to be demonstrated by the use of a relevant process control system).

IEC or ISO International Standards, where available, should form part of a CS in order to
achieve the objective stated in Clause 1. In the absence of IEC or ISO Standards, use maybe
made of national or other standards and industry specifications. National or other standards
or industry specifications may also be used to supplement the requirements contained in IEC
or ISO Standards.

4.2 Basic requirements

Basic requirements are those that contain, for a specific subject, information common to all
components or to a number of component families. Examples of IEC or ISO standards falling
into this category are:

IEC 60062, Marking codes for resistors and capacitors

IEC 60063, Preferred number series for resistors and capacitors

IEC 60068, Environmental testing

IEC 60410, Sampling plans and procedures for inspection by attributes

ISO 9001, Quality management systems – Requirements

5 Requirements for Specifications

5.1 Format

There is no standardized format for the content and layout of a CS or AS. A CS or AS may
take the form of a manufacturer's data sheet. Alternatively, it may be written by user interests
to fit a specific application.

* In this document, “ratings” means rated values or limiting values as appropriate.
All CSs and ASs shall have an IECQ front page containing, as a minimum, the following information (see Annex A for layout):

a) the name of the IECQ CB under whose authority the Specification is published and, if applicable, the name of the organization from whom the Specification is available;

b) the IECQ logo and the number allocated to the Specification by the IECQ CB, in accordance with 5.3;

c) issue status and record of amendments;

d) the number (and issue number where relevant) of the IEC or ISO International Standard, or generic (and, if appropriate, sectional) specification or a Technology Approval Schedule (TAS) relevant to the CS;

e) a statement (as agreed by the originator) indicating if the Specification is “Publicly available” or “Proprietary”.

5.2 Use

A Specification may form the basis for the establishment and maintenance of an IECQ Approved Component Certification or IECQ Approved Process Certification.

5.3 Numbering

IECQ Specifications shall be uniquely identified by a numbering system maintained by the IECQ CB. The Specification originator should contact its IECQ CB for the allocation of an individual identification number for the Specification.

The numbering format used by the IECQ CB shall conform to the following format:

IECQ-CS 03xx00-XX0001{ed1.0}en where:

IECQ = identifies that it is a Specification used within IECQ

CS = Component Specification (AS may be used where a separate Assessment Specification is issued)

03xx00 = identifies the Scheme/Programme for which the specification has been developed

033200 = IECQ AC-AQP

033100 = IECQ AC-TC (Technology Certification)

038000 = IECQ LED Lighting

XX = region of where the Specification is originated

(e.g. DE Germany, RU Russia, CN China, UK United Kingdom, etc.)

0001 = the sequential number per region

{ed1.0} = edition number

en = language – definitive shall be English

NOTE The numbering system detailed above is not retrospectively implementable on previously issued Component/Detailed Specifications issued under the Fast Track process.

5.4 Content

Specifications may contain three sections as detailed herein; all CSs shall contain Section One: General data as a minimum.
5.4.1  Section One: General data

The CS shall contain a description of the component (including specific details of scope for which approval is sought) and shall give limiting conditions of use. It shall also specify operating conditions and characteristics, and the relevant component application areas. The CS shall also include descriptions of reliability test conditions, marking, ordering information and primary stage of manufacture and any subcontracting process arrangements. 5.4.1.1 to 5.4.1.5 identify detailed aspects, the inclusions of some of which are mandatory.

5.4.1.1  Description of the component

The following aspects among others may be included:

- function;
- generic or standardized type numbers;
- details of the outline, dimensions, materials, construction and environmental capabilities as appropriate, terminal connections;
- logic symbol (where relevant);
- appropriate electrostatic discharge (ESD) or hazard warnings;
- appropriate hazardous substance (HS) or hazardous substance free (HSF) limits;
- others.

5.4.1.2  Limiting conditions of use

The CS shall include maximum ratings or a combination of ratings, for example for current, voltage, power and temperature.

NOTE  These ratings are not used for assessment purposes unless the CS states otherwise.

The CS shall identify the value of any parameter that, if exceeded, might impair permanently the reliability of the component.

5.4.1.3  Operating conditions and characteristics

The CS shall include the values of those functional and environmental parameters that describe the features and capabilities of the component. The CS Section Two: Quality Conformance Test Schedule (QCTS) shall describe the relevant test schedules and methods of inspection in accordance with 5.4.2. The CS shall include a specification of the reliability of the component.

5.4.1.4  Areas of component application

The CS shall describe suitable areas of application. Reference may also be made to safety requirements if applicable.

5.4.1.5  Additional information

The CS may include specific technology related data for example details of:

- special test or operating conditions,
- application data, and
- installation and handling (for example ESD aspects) data, etc.
5.4.2  Section Two: Quality Conformance Test Schedule

Section two may also be a separate publication known as an IECQ Assessment Specification where such is used with multiple Component Specifications of the same family, see Annex B.

5.4.2.1  Procedure

The first subclause of Section Two of the Specification procedure shall contain a description of the procedures utilized to a) qualify the Approved Component and b) provide on going compliance, as below:

a) Product Approval – For product approval, the procedure shall be in accordance with the Approval Process Plan/Test Plan, e.g. TTI-PA-TP001, Ver.1. This shall be the Applicant’s internal controlled document number of the Test Plan used.

b) Quality Conformance – For quality conformance inspection, the procedure shall be in accordance with the CS, e.g. IECQ-CS 033200-TW0001. This shall reference the CS number.

The information of inspection lot/sampling plan, test samples and quality conformance inspection procedure shall be described.

5.4.2.2  General

In general, Section Two shall include information of inspection lot/sampling plan, test samples and quality conformance inspection procedure.

5.4.2.3  Format

Although there is flexibility with respect to the format of this section, its content should normally conform to the relevant requirements of this Operational Document for the component concerned and related Section One: General data of the specification.

5.4.2.4  Content

Section Two shall prescribe the testing and inspection methods and sequence and periodicity of tests required to verify features defined in the relevant Section One: General data. Where standard IEC 60068 test methods are available they shall be used. Where such do not exist, test method details shall be included in Section Three of the specification. Where they exist, reference shall be made to preferred standard inspection levels, standard test sequences for preferred applications, standard environmental test procedures, standard test and measurement methods as well as to IECQ basic, generic and sectional specifications, as applicable.

5.4.3  Section Three: Test method

Section Three shall describe the test method with detail technical information, reference document and requirements of each test items for which an IEC or ISO International Standard/Specification does not exist.

5.5  Preparation

IECQ Specifications shall be prepared by the relevant manufacturer(s) and/or by user interests, in conjunction with their IECQ CB.
5.6 Approval and issue

5.6.1 General

The IECQ CB is responsible for ensuring that CSs meet the requirements of this OD and other IECQ Rules. Once satisfied (including as a minimum the witness test) the IECQ CB shall approve the CS for release and maintain a master library of approved CSs.

5.6.2 Publicly available specifications

Where agreed by the originator of the CS, the IECQ CB shall forward a copy of the CS to the IECQ Secretariat for their posting to the IECQ publications area of the IECQ website.

5.6.3 Proprietary specifications

Where the originator has requested that the CS is not made public, the IECQ CB shall maintain the CS as an internally controlled confidential document and only make copies available to organisations other than the originator, upon agreement from the originator in the form of either letter or electronic media.

6 Amendment and withdrawal of IECQ Specifications

The amendment and withdrawal of CSs is the responsibility of the IECQ CB and its originator. It shall be a controlled process with full traceability within the originating IECQ CB and organization.

Amendment or withdrawal of Specifications shall be subject to agreement between the originator and the IECQ CB responsible for approving the CS or AS.

Amendments shall be issued as a newly approved specification (in accordance with 5.6) with an increased edition number in accordance with Clause 5.3 which shall replace and supersede the previous version and shall contain a timeframe included within the new version for withdrawal of the previous specification.

However, where agreement cannot be reached between the IECQ CB and the originator to issue the amended CS, the IECQ CB may review the on-going validity of Certifications issued against that CS, noting that the originator may refer the matter to the IECQ Board of Appeal.

7 Transfer of Component Specifications and Assessment Specifications between IECQ CBs

As the responsibility for approval and issue of a CS sits with IECQ CB that initially approved it, a CS cannot be used by other IECQ CBs without their review and approval for its use. If the CS is “Proprietary”, permission of the originator must also be obtained (see 5.6.3).

Where a second and subsequent IECQ CB believes that a CS contains errors, they shall inform the IECQ CB that initially approved the CS. This does not prevent an IECQ CB or interested party from contacting the IECQ CB that initially approved the CS with suggested improvements.
Annex A  
(normative)

Front page of a Component Specification

<table>
<thead>
<tr>
<th>Component Specification available from:</th>
<th>Component Specification Number:</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Publicly available Specifications</td>
<td>IECQ-CS 033200-XX0001(ed1.0)en</td>
</tr>
<tr>
<td>✗ IECQ Certification Body - under whose authority the Component Specification (CS) is published</td>
<td>for use within the IECQ Approved Component Scheme – Automotive Qualification Programme (IECQ AC-AQP) [Sample Text dependent on Programme]</td>
</tr>
<tr>
<td>✗ IEC Webstore</td>
<td>Edition: 1.0</td>
</tr>
<tr>
<td>✗ IECQ Website <a href="http://www.iecq.org/publications/specifications/">http://www.iecq.org/publications/specifications/</a></td>
<td>IECQ Certification Body:</td>
</tr>
<tr>
<td>☐ Proprietary Specifications</td>
<td>Product description:</td>
</tr>
<tr>
<td>✗ IECQ Certification Body - under whose authority the Component Specification (CS) is published</td>
<td></td>
</tr>
<tr>
<td>✗ Other:…</td>
<td></td>
</tr>
</tbody>
</table>

Electronic Components of Assessed Quality

Component Specification in according with:

Outline drawing and install information:

Applicant:

Guidelines
- **Component Specification available from:** The Category of Component Specification “Public” or “Proprietary”, other sources of availability maybe be listed under “Proprietary” if applicable. In accordance with 5.6.
- **IECQ Certification Body:** The name of the IECQ Certification Body under whose authority the Component Specification is published.
- **Component Specification Number:** The unique identification number allocated by the IECQ CB in accordance with IECQ OD 302 “Numbering”, and Edition status. In accordance with 5.3.
- **Electronic Components of Assessed Quality Component Specification in according with:** The list of standards and or specifications that are utilized within the Component Specification where relevant, these maybe IEC or IECQ or ISO Standard, or generic (and, if appropriate, sectional) specifications or a Technology Approval Schedule (TAS) relevant to the CS or where in the absence of an IEC, IECQ or ISO standard a national and or industry recognized standard/specification.
- **Product description:** A brief description of the approved components, piece parts or material.
- **Outline drawing and install information:** An outline drawing with main dimensions that are of importance for interchangeability and applicable installation information.
- **Applicant:** The creator of the Component Specification.
 Annex B  
(informative)  

Family based Component Specification guidance  

B.1 Scope  
This Annex provides guidance for the structure of a set of specifications consisting of a series of interrelated documents for electronic components in a form, which will provide for consistency in the development of IECQ Specifications used within the IECQ System.  

B.2 General considerations relating to specifications  

B.2.1 Component grouping  
For the purpose of specifications, electronic components are divided into families based principally on their function. Examples of possible families are: fixed resistors, transistors, diodes, connectors, printed boards, etc.  

These families may be divided into sub-families on the basis of function or technology or both, according to the composition of the family. For example, fixed resistors may be divided into low power, high power and precision, or into composition, film and wire-wound, or into normal and high stability.  

The sub-families may be further divided into smaller groups that have a common test schedule with similar inspection conditions and criteria, but differing in values for the ratings, characteristics and test requirements and in the requirements for the degree of quality assurance.  

B.2.2 Description of specifications  
Much of the required information in specifications for components is common to more than one family and, similarly, within a family, information is applicable to more than one sub-family, for example:  
− preferred values for test conditions, severities, ratings, dimensions and test requirements are often common to one or more families or sub-families;  
− a test schedule which contains part of the quality assessment procedures, namely, the grouping of the tests, inspection levels and acceptance criteria, may be common to a family or sub-family. However, there may be more than one test schedule applicable within a family or sub-family, each corresponding to an intended application or group of applications.  

To avoid unnecessary repetition and to achieve the necessary uniformity of presentation, the following levels of specifications have been adopted as standard:  
− basic;  
− generic;  
− sectional;  
− blank detail;  
− detail.
B.2.2.1 Basic specifications

Basic specifications are those that contain, for a specific subject, information common to all components or to a number of component families.

B.2.2.2 Generic specifications

Such subjects as terminology and methods of measurement and test are mainly common to a family. This information may be included in generic specifications, each of which covers a family or sub-family.

B.2.2.3 Sectional specifications

In some cases, it may be convenient to introduce into the specification structure a level of document covering a sub-family. This document is referred to as a "sectional specification" and includes test schedules containing a selection of test methods, test specimens and acceptance criteria, severities and preferred values for dimensions and characteristics.

B.2.2.4 Blank detail specifications and general blank detail specifications

Blank detail specifications should be provided each time it appears to be appropriate, for the guidance of those concerned with the preparation of detail specifications. They prescribe the layout to be adopted and the information to be given in detail specifications. This guidance is especially important for systems in which the detail specifications are not prepared by a central body.

General blank detail specifications are blank detail specifications that may be used when existing blank detail specifications do not cover the requirements of new technologies or applications.

B.2.2.5 Detail specifications

Detail specifications give directly, or by making reference to other documents, all information necessary to completely describe a given component or range of components and to ensure conformance thereof with the requirements for quality assessment.

The customer detail specifications (CDS) require agreement between customer and supplier/manufacturer, and when applied in conjunction with the generic and sectional specification shall adequately describe the product (component/part). Additionally, the CDS may only be used within the limits of the manufacturer's approved capability.

B.3 Assessment levels

An assessment level relates to the degree of assurance of the quality of the components. It indicates the balance between the lot-by-lot tests and the periodic tests and also depends upon the severity of the sampling plans.

The sample sizes used for the sampling plans may be fixed and, in this case, the number of specimens to be tested and the number of defectives permitted are defined in the specification and do not take account of the size of the lot being inspected. This approach is usually applied for qualification approval testing and for periodic tests within the quality conformance inspection.

NOTE A selected grouping of tests with associated sampling procedures for a given component may be perfect for one customer but totally unacceptable for other customers, either because the assurance is too low or because the additional costs are too high.
B.4 Performance levels

The term "performance level" is used in some component families. It reflects a grouping of the environmental and mechanical stresses to which a component is tested and also such features as long-term stability of electrical characteristics. It is based on three factors:

- the test schedule;
- the severities of the test conditions (magnitude and combination of stresses);
- the end-of-test requirements.

It also permits the following differences between levels to be stated:

- further characteristics to be specified in addition to those that are mandatory;
- different (closer) tolerances on characteristics;
- difference severities for environmental testing.

A variation in one or more of these factors will result in a different performance level.