OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

FAIR USE POLICY

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

RESTRICTED

17374

DP/ID/SER.A/1159
17 February 1989
ORIGINAL : ENGLISH

QUALIFICATION AND SURVEILLANCE LABORATORY FOR CONSUMER ELECTRONIC PRODUCTS

DP/CPR/85/087/11-06

THE PEOPLE'S REPUBLIC OF CHINA

Technical report : IECQ Certification*

Prepared for the Government of the People's Republic of China
by the United Nations Industrial Development Organization,
acting as executing Agency for the United Nations Development Programme

Based on the work of Mr. Richardson
UNIDO Expert

Backstopping officer : H. Seidel, Engineering Industries Branch

United Nations Industrial Development Organization
Vienna

---

* This document has not been edited.

V.89-51792

TABLE OF CONTENTS

Introduction.

This report covers a visit to China between October 19th and November 14th 1986. It was sponsored by UNIDO, Vienna under Index No E 5973 Band Job Specification No DP/CPR/85/037/11-06/31313

The purpose of the visit was to conduct a seminar under the auspices of CEMEI at Guangzhou in Guangdong Province, for officials of approved and candidate manufacturers and independent test laboratories together with a seperate seminar forthe Inspection division of CEMEIwho form the National Supervising Inspectorate (NSI) of the International Electrotechnical Commission Quality System (IECQ).

The seminar was structured to provide lectures on various aspects of the system which affect manufacturers and independent test laboratories (ITLs) and to give senior members an appreciation of the system, its derivation and requirements together with an opportunity for them to question these and any associated subjects. A list of the subjects covered is given in Appendix 1.

For purposes of background information a resume of the structure of Quality Assurance systems for electronic components is given in Appendix 2.

The present arrangements in China are a result of

1. State Planning, i.e. where factories are located

2. The physical size of the country, giving some difficulties for the NSI at CEMEI in visiting these factories

3. Lack of test facilities at some factories, leading to testing being carried out at CEMEI and ITL's

4. and a parallel National System which also comprises a Product Licencing system, renewed annually.

Due to all these the number of visits made to any individual approved manufacturer or ITL also tend to be made on an annual basis which, may be satisfactory at the outset of the system growth, but which in the UK would be seen as an unacceptably long interval.

From a number of conversations with members of the NSI and manufacturers staff the philosophy of Quality Assurance, as against Inspection is seemingly only slow to be accepted. This is at least partly due, I believe, to the system of appointing staff to both enterprises themselves and also within them. Again due to communication difficulties it is not easy for ideas to be disseminated easily between enterprises, even using the same technology. It was interesting also to learn that some factories who had imported production lines had also imported management systems with them, and this included some quality control, but not necessarily quality assurance.

The seminar was attended by forty one people from thirty two organisations. These people were Senior Engineers, Engineers and Assistant Engineers who were engaged in Production or Inspection in their work units or Institutions.

This coverage shows that a high degree of interest in IECQ is present in China, and I believe should be actively encouraged by whatever means possible. At the same time I believe that the main interest comes from enterprises which are involved in exporting products, either as components or as parts of equipment where they perceive that an independent assessment of quality by an internationally recognised third party is an important selling point to the rest of the world. It also seems that they, at least, recognise that quality of products an integral part of any export promotion.

This recognition is also worthy of encouragement since in general I have the feeling that quantity is more important than quality.

Conclusions.

1. I was informed, admittedly second hand from the project organiser, that the seminar had been well worthwhile, and had generated a great deal of interest from the participants.

2. The ISI said that they had learned much from it.

3. The Chinese electronic components industry is beginning to see potential advantages in the IECQ system and would like to see more business arising from it but also perceive a difficulty in that the number of specifications available are very limited.

4. I believe that the extent of interest in IECQ will grow if the role of the State in day-to-day control of industry becomes smaller, as appears likely. This may well trigger off a change from Product Licence to third party certification. It will then become essential that a full appreciation and understanding of the IECQ system is present in the various Enterprises and Institutes.

Recommendations.

1. Encouragement should be given to the Electronic components industry to seek approval for their products in the IECQ system, with this.

2. The IECQ itself should be pressured in any possible way to make more product specifications available in the shortest time span.

3. The Chinese responsible body, the National Authorised Institution, should be educated in the ways available of manipulating the system to their advantage, as other nations do. That is to put up Chinese National specifications as Provisional IECQ ones and gain approvals to them.

4. A programme to educate the industry in modern methods of total quality management should be considered.

These latter two may need foreign expertise to carry out.

Appendix 1.

Subjects covered in the seminars.

1. Background of the IECQ system and its derivation fro, BS 9000 and CECC.

2. Approval of a manufacturer, general

3. Approval of an ITL, general

4. UK practice in detailed NSI approval of a manufacturer.

5. For an ITL

6. Qualification Approval and Capability Approval, generally including similarities and differences together with background

7. Detailed product approval, Qualification and Capability Approval

8. Documentation requirements, Quality manual, Proceedure manual and Capability manual.

9. Maintainance of product approval

10. The Chief Inspector, head of an ITL

11. Audit testing

12. Surveillance of an organisation.

Appendix 2.

Structure of QA Systems.

In all countries operating a QA system for electronic components, there are two responsible bodies. Practice varies from country to country, but in outline the areas of responsibility of the two bodies are:

i) The National Authorized Institution (NAI or CNH) is responsible for the overall adminstration of the system and may be responsible for publication of specifications and the issue of certificates of approval. The CNH is usually part of, or closely associated with, the National Standards Organization (NSO or CNN).

ii) The National Supervisory Inspectorate (NSI or CNS) is responsible for surveillance of the firms seeking or holding approval for producrs or procedures under the QA system. It has long been accepted that central testing of all electronic products is impossible due to production volumes, so that testing according to specifications must be carried out by manufacturers. The task of the NSI is therefore to ensure that this testing is performed correctly. The NSI is also responsible for approving specifications and may also be responsible for certification. The inspectorate is sometimes part of the NAI, but is more often separate. For example in France, the NSI is administered by the PTT, in the UK by the Ministry of Defence, in the USA it is independent, in Belgium it is part of the NAI.

The national organizations parallel the regional and international systems which they have the task of implementing - but again there are differences. Fig.1 shows the basic structure of IECQ within the International Electrotechnical Commission (IEC). The controlling body for IECQ is the Certification Management Committee (CMC) to which all 24 NSI's send delegates. The Inspectorate Coordination Committee (ICC) controls the operation of the NSI's but reports to the CMC. Technical matters are dealt with byTechnical Committees (TC) of IEC, whilst organizational matters are dealt with by Working Groups (WG) of IECQ reporting to the CMC. Fig.2 shows the structure of CECC which has some important differences from that of IECQ, for example links between CECC and CENELEC are not as close as those between IECQ and IEC. In fact, CECC is reponsible to the FEN, en independent body established in Germany as a vehicle for CECC for legal reasons. The body responsible for the CNS' is the Electronic Components Quality Assurance Committee (ECQAC) which, unlike the relationship between CMC and ICC in IECQ, is independent of the CECC Management Committee (CD). All member CNH's send delegates to the CD, and all CNS to the ECQAC. Technical and administrative matters are all dealt with by Working Groups (WG) which report to the CD.

Within the systems, the documents controlling their operation are organized in a well defined hierarchy. Taking IECQ as an example, the main governing documents are QC001001 - Basic Rules and QC001002 - Rules of Prodedure. These make reference to the various layers in the document system as follows:

1) Basic Specifications (BS)cover such aspects as test methods, sampling plans, terminology, units etc. and are usually documents published by ISO or IEC and are prepared by a technical committee of one of those bodies.

2) Generic Specifications (GS) apply to a family of electronic components, such as resistors, capacitors, discrete semiconductors or integrated circuits. They cover specific test and inspection requirements for quality assessment of that family and are normally prepared by a technical committee of IEC.

3. Sectional Specifications (SS) may be prepared to cover sub-families of components where it would be impractical to issue a generic specification covering a wide range of different requirements.

4. Blank Detail Specifications (BDS) are derived from generic or sectional specifications and present precise rules and criteria for the writing of detail specifications describing actual products. Again, these are normally prepared by a RC of the IEC.

5. Detail Specifications (DS) describe the performance and characteristics of a component or range of components. They must follow the rules laid down in the relevant BDS, and may be prepared by either:-

a) a Technical Committee of IEC
or b) the NAI of a participating country
or c) a manufacturer approved under the System.

In order to ensure that members of Technical Committees are well informed, NAI's in participating countries nominate experts in the respective fields to membership of the TC's. By this means it is hoped that, not only is there a wide representation of national interest, but also a wide representation among classes of interested groups including government, component manufacturers, equipment manufacturers and end users.

3. Procedures.

The usual reason for a manufacturer seeking QA for his products is in response to a perceived need in the market place. The factors involved are very complex, but it is clear from the experiences in established QA systems that approval is not sought immediately for the latest technologies, but a period elapses for a new technology to become established.

Where all the levels of specification down to BDS already exist but there is no DS, a manufacturer needs to write one. This will need to be approved by his NAI before he can start testing against it. Where appropriate generic, sectional or blank detail specifications do not exist, a manufacturer needs to make representations through his NAI to the relevant technical committee to have them written. As an interim measure, in the interest of accelerating approvals within IEC, the CTC agreed at its 1986 meeting that any generic, sectional or blank detail specifications in CECC may be adopted as provisional specifications in IEC.

Before embarking on a QA exercise, a component manufacturer must gain the approval of his NSI of his manufacturing facilities. The NSI will need to satisify itself on the following points:

a) production capability
b) quality control organization
c) quality control procedures during manufacture
d) documentation control
e) measurement and test facilities
f) inspection and sampling procedures
g) release and certification procedures

Only after he has gained approval for his manufacturing facility under a generic specification and when a satisfactory approved detail specification exists may a manufacturer, with the approval of his NSI begin the testing leading to qualification approval. The NSI will monitor all stages of this process and will approve the final test report. Only then can the manufacturer release his product as approved under the System. The fact

of the approval will be reported in the Qualified Products List (QPL) and on other information media, such as a computer database, as appropriate. Each QA system has its own QPL - for example FD9002 for B59000, CECC02200 for CECC and 00001005 for IEC).

One of the important aspects of a QA system is traceability. The component manufacturer will issue to his customer a certificate of conformity which includes, among other requirements, production batch identification. Should a user subsequently experience problems with components it proves possible, in most cases, to identify the reasons for the problems. Since QA systems also provide for approval of distributors to act as selling agents between component manufacturers and users, it is vital for their procedures to maintain the traceability.

Receipt of a certificate of approval for components covered by a detail specification is not the end of the story. To retain that approval a manufacturer must be in continuous production and must satisfy the NSI by the results of lot-by-lot and periodic tests that his products continue to conform to the specification.

Different methods may be used for sampling and assessment of components within QA systems. For many years, sampling has been carried out against standard sampling plans such as IEC Publication 410. In Europe (and IEC) acceptance or rejection of sample lots has been on the basis of Acceptable Quality Level (AQL) whilst in the USA Lot Tolerance Percent Defective (LTPD) criteria have sometimes been used. In Japan, a completely different approach, the parts per million (ppm) concept has been used in which manufacturer and customer cooperate to reduce the proportion of defective components incorporated in the customer's equipment to very low levels. More powerful statistical methods and the increasing use of computers are now bringing changes to the traditional approach based on the methods of attributes testing. It is expected that these new methods will appear very shortly in national specifications from the USA.

The above paragraphs describe the normal route to obtaining qualification approval for electronic components. There are a number of situations where this approach may not be appropriate.

a) where the product is not standard and is normally supplied to a customer requirement, for example hybrid integrated circuits, transformers and printed circuit boards

b) where the component technology is new and has not been fully evaluated

c) where customer or end user requirements are such that they demand more stringent testing in one area and/or less stringent testing in others.

The first of these situations, and to some extent the second, are covered by the concept of capability approval. Here, all a manufacturer's processes are examined and approved in detail, including design, and then the boundaries of the declared limits of capability demonstrated by making and testing capability qualifying components (CQC). In fact, far from being an easy option for the components manufacturer, the disciplines imposed by a capability approval are often more severe than for normal QA.

To purchase a component against a capability approval a customer must agree a detail specification with a manufacturer and the components will be released after tests according to that specification. Alternatively, if a manufacturer has standard product ranges which fall within his capability he may, with the agreement of the NSI, have these entered in the QPL as approved products. Capability approval was first introduced under BS9000, where it is now well established. It has been adopted by CECC in which system the first capability approval was granted in January 1987 and it is included in the Rules of Procedure for IECQ.

The third need above, to vary the specification requirements may be met in several ways. In any system, it is open to a customer to request additional testing to that in the specification (if he is prepared to accept the additional cost). However, in the BS9000, CECC and IECQ systems it is not permitted to omit tests or to widen the test limits. This is in contrast to the MIL system in the USA where such waivers are allowed. A different approach, adopted in BS9000 but not yet in CECC, is the concept of a general specification in which a customer can ask for any tests he requires subject only to some very basic requirements, but still retain the benefits of the independent surveillance of the NSI, lot release and traceability.

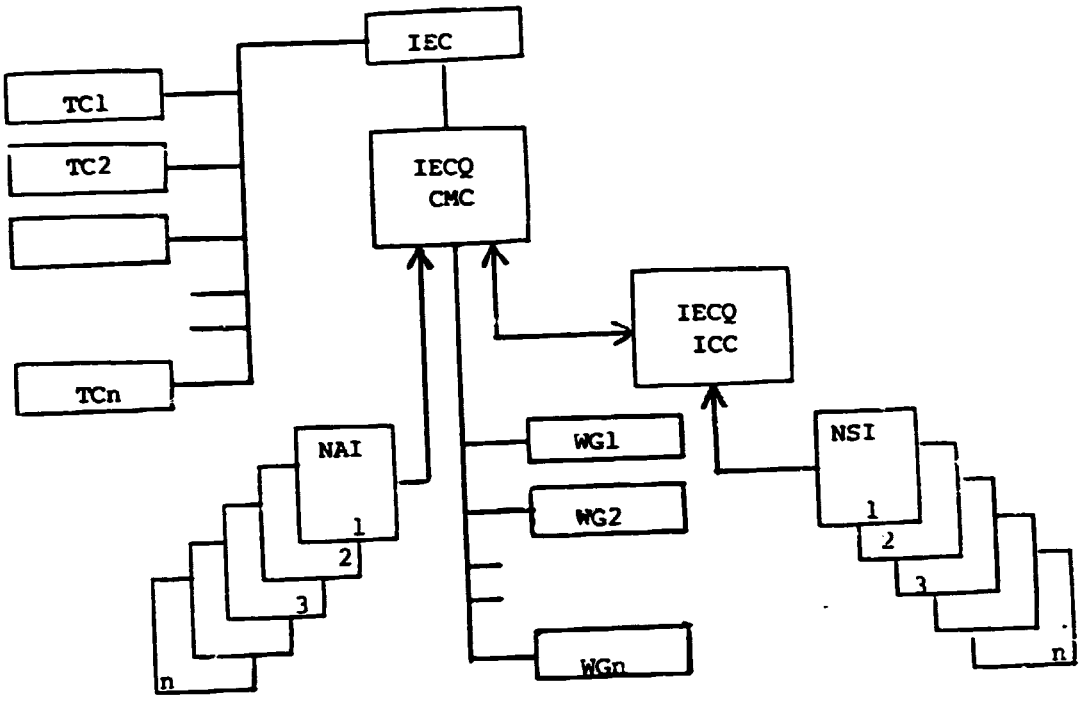

Figure 1 IECQ System Organization

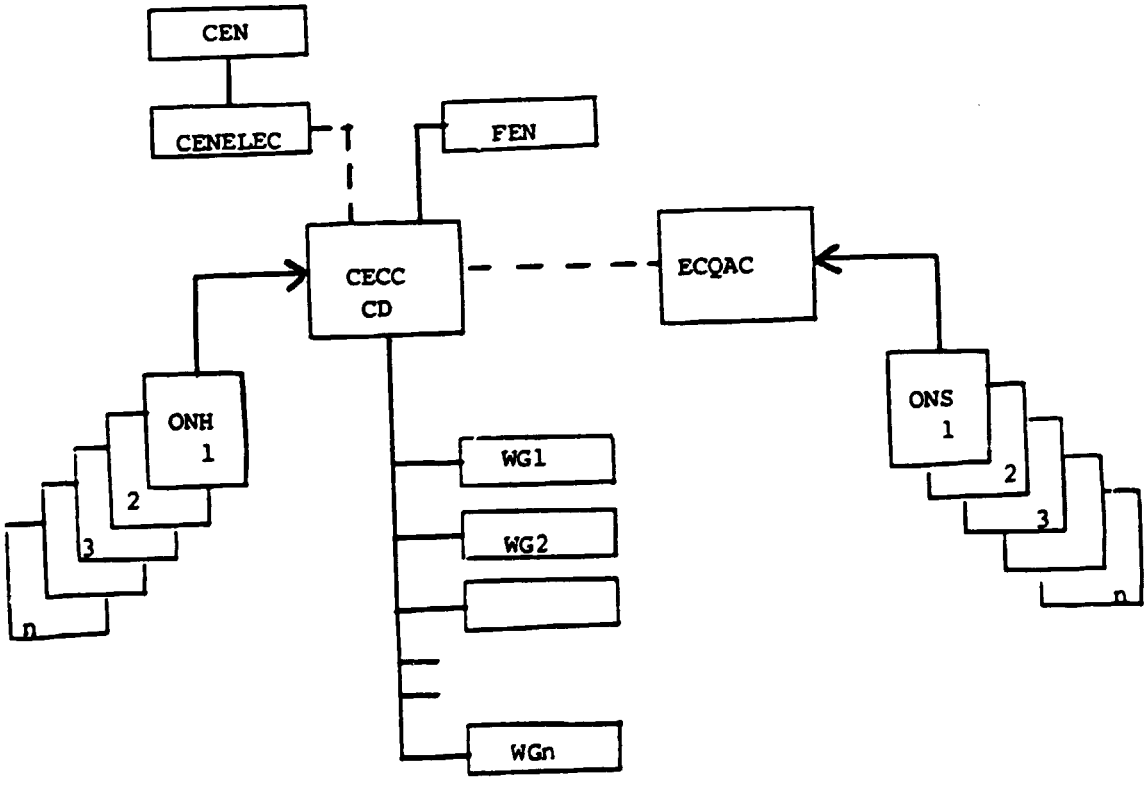

Figure 2 CECC System Organization