

**Harmonized system of quality
assessment for electronic components**

Guide to total quality management (TQM) for CECC-approved organizations

The European Standard CECC 00806:1994 has the status of a
British Standard

ICS 31.020

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Committees responsible for this British Standard

The preparation of this British Standard was entrusted by Technical Committee L/9, Electronic components policy committee, to Subcommittee L/9/3, Quality assessment procedures, upon which the following bodies were represented:

- Federation of the Electronic Industries
- National Supervising Inspectorate (BSI PC)

This British Standard, having been prepared under the direction of the Electrotechnical Sector Board, was published under the authority of the Standards Board and comes into effect on 15 April 1997

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The following BSI references relate to the work on this standard:
Committee reference L/9/3
Announced in *BSI Update*
February 1997

ISBN 0 580 27316 4

Amendments issued since publication

Amd. No.	Date	Comments

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National foreword

This British Standard has been prepared by Subcommittee L/9/3, and is the English language version of CECC 00806:1994 *Harmonized system of quality assessment for electronic components. Guide to total quality management (TQM) for CECC-approved organizations*, published by the CENELEC Electronic Components Committee (CECC) of the European Committee for Electrotechnical Standardization (CENELEC).

This British Standard is published under the direction of the Electrotechnical Sector Board whose Technical Committee L/9 has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on interpretation, or proposals for change, and keep UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

Cross-references

Publication referred to	Corresponding British Standard
EN 100114-1:1994	BS EN 100114 <i>Rule of Procedure 14: Quality assessment procedures</i> Part 1:1994 <i>Approval of manufacturers and other organizations</i>
EN 45002:1989	BS 7502:1989 <i>General criteria for the assessment of testing laboratories</i>
CECC 00015:1991	BS EN 100015 <i>Basic specification. Protection of electrostatic sensitive devices</i>
CECC 00016:1990	BS CECC 00016:1991 <i>Harmonized system of quality assessment for electronic components. Basic specification: basic requirements for the use of statistical process control (SPC) in the CECC system</i>
CECC 200000:1993	BS CECC 200000:1993 <i>Harmonized system of quality assessment for electronic components. Requirements for process assessment schedules for process approval</i>
CECC 210000:1994	BS CECC 210000:1995 <i>Harmonized system of quality assessment for electronic components. Requirements for technology approval schedules (TAS)</i>
ISO 9001:1994	BS EN ISO 9001:1994 <i>Quality systems. Model for quality assurance in design, development, production, installation and servicing</i>
ISO 9002:1994	BS EN ISO 9002:1994 <i>Quality systems. Model for quality assurance in production, installation and servicing</i>
ISO 9004-1:1994	BS EN ISO 9004 <i>Quality management and quality assurance standards</i> Part 1:1994 <i>Guidelines</i>

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the CECC title page, pages ii to iv, pages 1 to 28, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Förderverein für Elektrotechnische Normung (FEN) e. V.
Cenelec Electronic Components Committee

CECC

Système Harmonisé d'Assurance de la Qualité
des Composants Electroniques



Harmonized System of Quality Assessment for
Electronic Components

**GUIDE TO
TOTAL QUALITY MANAGEMENT
(TQM)
FOR CECC-APPROVED
ORGANIZATIONS**

Harmonisiertes Gütebestätigungssystem für
Bauelemente der Elektronik

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Edition
Issue
Ausgabe

CECC 00 806

1994



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Foreword

The CENELEC Electronic Components Committee (CECC) is composed of those member countries of the European Committee for Electrotechnical Standardization (CENELEC) who wish to take part in a harmonized System for electronic components of assessed quality.

The object of the System is to facilitate international trade by the harmonization of the specifications and quality assessment procedures for electronic components, and by the grant of an internationally recognized Mark, or Certificate, of Conformity. The components produced under the System are thereby accepted by all member countries without further testing.

At the date of printing of this guidance document, the member countries of CECC are Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom, and copies of it can be obtained from the addresses shown on the blue fly sheet.

Preface

This document was prepared by CECC WG Quality Assessment Procedures. The text of this document was not circulated to the CECC for voting but the document has been approved by the President of the CECC for printing as a CECC Guidance Document.

1 Purpose of this guidance document

CECC provides a European system of standards and certification for all companies concerned with the design, manufacture, distribution and use of electronic components and the provision of related services. CECC recognizes that many of these companies are already implementing, or may wish to implement, TQM practices in association with CECC certification.

The purpose of this document is to assist CECC approved companies, or those seeking CECC approval, in considering the parallel implementation of CECC procedures and TQM practices. It seeks to highlight the common elements of TQM, based on practical examples and experience from the electronic components industry, and to illustrate the compatibility of CECC requirements with TQM methodology.

2 What is Total Quality Management (TQM)?

2.1 Introduction

TQM is an innovative approach to business management, embracing advanced concepts and working methods to ensure an effective, efficient way of running an organization. Whilst it invokes many specific management techniques and business control procedures, it is not a set of rules to be followed blindly. Although TQM has as its basis traditional Quality Management Systems (such as those required by the EN 29 000 series), it combines conventional quality methods traditionally restricted to production activities with all other aspects of a business and its place in society.

TQM is the practical application of the philosophy that the most efficient methods of working are those which produce and deliver the intended product and/or service, at the quality required by the customer, without waste of material, time or energy. In particular, it widens the concept of customer/supplier relations to include internal links within the organization.

The introduction of a TQM programme in any company requires commitment at all levels of the organization. It should not be assumed that success is guaranteed: perhaps 60 % to 70 % of TQM exercises fail because of questionable commitment, economic factors or for other reasons.

It is recognised that the most effective way of managing a given situation depends on the organization, resources, people and culture concerned. Identifying a single model for the implementation of TQM is thus difficult, if not impossible. This document attempts to highlight those aspects of TQM which are thought to be most applicable to the European Electronic Components Industry.

2.2 Definitions

Many organizations are attempting to identify and specify the basic principles of TQM, resulting in many and varied definitions. In the CECC context, however, a number of acknowledged models and definitions of TQM may serve to illustrate the key principles. (See Annex A).

3 Why TQM?

It is estimated that about one third of all effort expended in business is wasted because of errors which occur in conducting business operations. Errors tend to multiply, and errors in one part of an organization create problems elsewhere, leading to further errors and problems. In consequence, most of the staff in any company will spend a significant proportion of working time correcting errors, seeking to identify causes, checking reasons for late delivery and apologizing to customers.

TQM practices are designed to reduce or eliminate errors and waste, and to improve the effectiveness, flexibility and competitiveness of a business as a whole, involving all activities and the entire workforce in the way the business is conducted. TQM can be applied throughout an organization so that staff from different departments with differing priorities and abilities communicate with, and assist, each other. It may reasonably be argued that this is the natural way for small organizations to function, but that growing or large organizations, with a tendency towards increasing bureaucracy, overstretched communications channels, conflicting functional goals and even internal rivalries between some individuals and departments, may lose touch with the basic principles which are embraced within the TQM concept.

In the modern business environment companies need consistently to offer products and/or services that have customer appeal if they are to advance their position, or even maintain their foothold, in the market place. Customer appeal may be achieved in many ways, but in the professional electronic components business the dominant factors that enhance market acceptance are technical performance, product integrity (quality), product cost, reliability, availability, on time and accurate delivery service and the supplier's reputation.

The application of TQM methodology should ensure that all these factors are continuously addressed by the company so that a progressive improvement is achieved in the match between the product or service and the customer's requirement.

The key factor in achieving sales is the cost of a product or service. This cost is increasingly understood as the "total cost of ownership" covering not only the initial purchase cost, but also all consequent costs during the usable life of the purchased product or service. This total cost should be attractive to the customer when compared with the cost of competing products or services. In a TQM environment, the management determines the most cost effective way of designing, manufacturing or processing, marketing and delivering the product or service, and introduces a planned programme whereby all processes are critically examined on a regular basis to identify possible improvements. Inefficiency and waste are progressively eliminated, and product/service cost, and profit, may be optimized.

The statistical control of production and all other processes within identified limits prevents the production of out of tolerance products or services and minimizes the need for inspection and test phases. Products or services achieve consistent performance and quality, and thus enhance the reputation of the manufacturer or supplier in the market place.

The process control systems applied within a TQM approach provide records of performance that may be used as evidence towards achieving or maintaining CECC Technology Approval, Process Approval or product qualification, if this should be a management requirement. Achievement of these approvals provides an independent assurance of product/service quality to customers and eliminates or reduces the need for a multiplicity of separate assessments by different equipment manufacturers or trade associations.

The successful application of TQM benefits both manufacturer/supplier and customer. The TQM concept is thus fully supported by the CECC System as a valid management strategy which is easily linked to CECC approval.

4 Established approaches to TQM

4.1 Standards and guidelines relevant to TQM

There are several international and national draft standards and standards relating to TQM. These include:

- the draft ISO publications in the series ISO 9004: Quality Management and Quality System Elements, Part 1: Guidelines (not yet published), Part 2: Guidelines for Quality Management (not yet published), where reference is made to TQM elements for quality improvement (see Annex A.6).
- British Standard BS 7850: Total Quality Management, Part 1: Guide to Management Principles, Part 2: Guide to Quality Improvement Methods, which repeats these criteria and provides further related material (see Annex A.2).

4.2 Application of TQM to electronic components companies and their customers' organizations

TQM structures, requirements, programmes, etc., exist in a great variety in the electronic components industry and its customers' organizations. This document provides only a brief overview, indicating a few characteristic features.

4.2.1 Structures and programmes

There are many common elements in the planning and implementation of TQM structures and programmes. Annexes A and B illustrate this point.

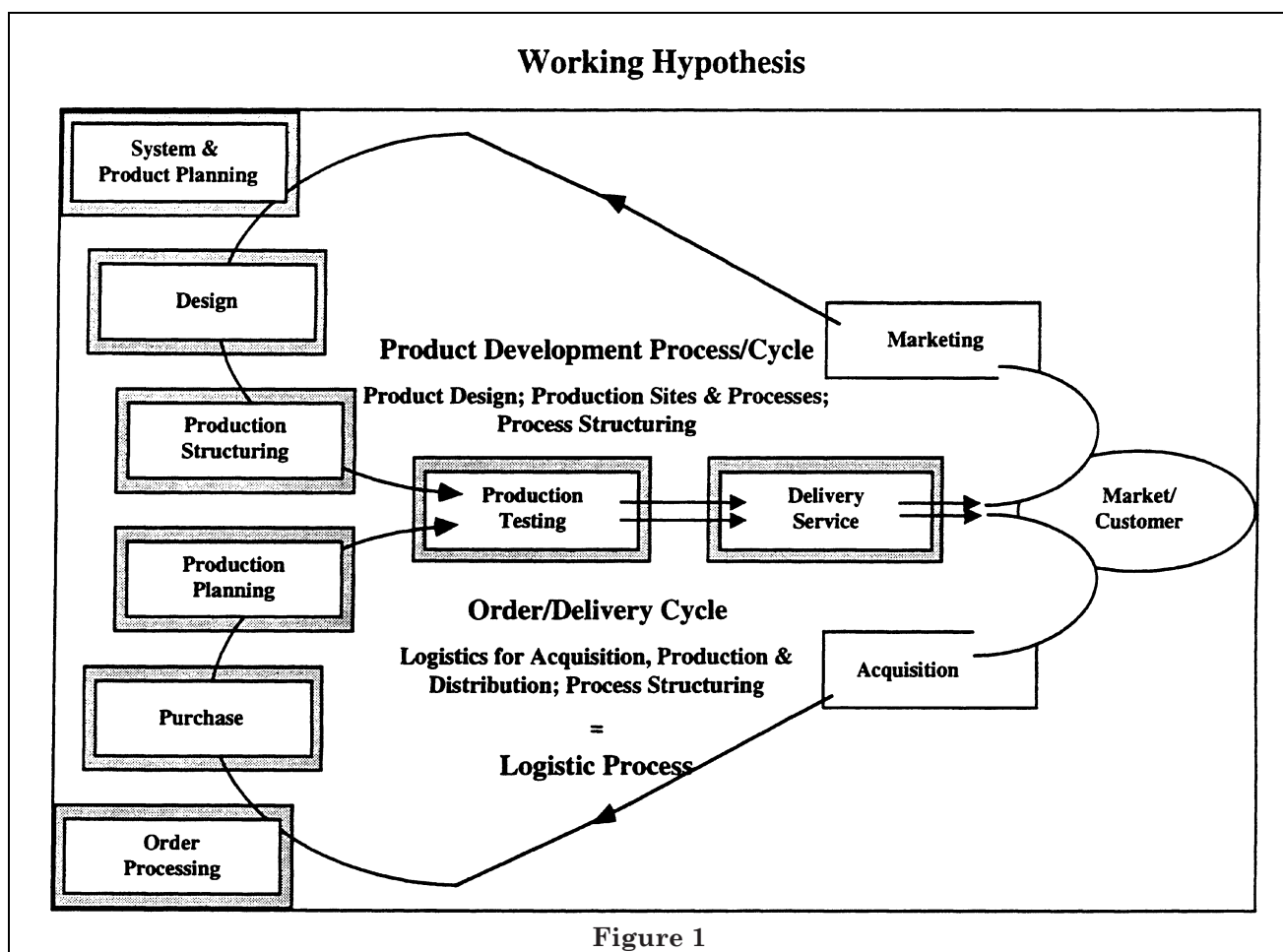
4.2.2 Company awards

Company quality improvement programmes and awards may provide the opportunity for progression to national or international awards. However, it is for each company to determine the possible need to apply for such external recognition, in accordance with its quality and marketing strategies.

4.3 TQM methodology

Methods, tools and techniques used in TQM may be categorized in three classes:

- 1.) Methods, tools and techniques used in TQM programmes (see 4.3.1).
- 2.) Methods, tools and techniques used in process management, applied to control and improve primary and secondary processes (see 4.3.2).
- 3.) General tools with a wide application, usually in teamwork, brainstorming, problem solving, visualization and consensus building (see 4.3.3).



To date, only general tools (see 4.3.3) have been widely incorporated in international and national standards. However, there is clear evidence that modern and revised management methods, reflecting the content of 4.3.1 and 4.3.2, have been crucial to the success of the Quality Programmes of award winners. Listed below are the main elements used in TQM. A list of specific techniques is given in Annex C.

4.3.1 Methods, tools and techniques used in TQM

The following main techniques (which each cover a variety of issues and approaches, as listed in Annex C) are usually present in company TQM activities:

- Stimulation of initiative
- Organization and planning
- Setting objectives, defining targets to satisfy the customer
- Execution (realization of plan, actions, reaching targets)
- Evaluation (checking, feedback, maintaining improvement).

4.3.2 Methods, tools and techniques used in Process Management

Figure 1 below provides an outline of the primary process relating to the development, production/processing and sale of products and services, including customer interfaces. Specific methods, tools and techniques are used throughout the primary process to support the activities identified in Figure 1. The totality of these complementary activities, including supporting methods, tools and techniques, may be termed "process management". Many of the approaches which may be used in process management in the context of a TQM programme are listed in Annex C.

The principal aspects of process management are:

- Sales/marketing
- Logistics
- Development methods
- Manufacturing
- Supply management.

4.3.3 General procedures and tools

The following general procedures are widely used in both quality management and process management:

- Benchmarking/competitive analysis
- Brainstorming
- Problem solving.

Problem solving cycle steps may be summarized as:

1. Diagnosis, problem definition
2. Quantifying the problem
3. Finding solutions
4. Implementing solutions
5. Measuring the results and providing feedback into the problem solving cycle.

4.4 Award systems

A number of award systems have been developed which address aspects of TQM. These include:

- the European Foundation for Quality Management's European Quality Award (see 4.5 and Annex A.3)
- the Malcolm Baldrige National Quality Award (see Annex A.4)
- the Deming Prize (see Annex A.5).

Each of these award systems reflects a certain bias in the focus of TQM in Europe, the United States of America and Japan; CECC, as a European organization, favours the E.F.Q.M. award criteria, particularly as they emphasize various elements not explicitly covered by the other award systems referred to. There are numerous other national and company awards based on TQM principles.

4.5 The European Foundation for Quality Management (E.F.Q.M.)

4.5.1 Status

The European Foundation for Quality Management is a non-profit organisation under the laws of the Netherlands, founded in 1988. It maintains a representative office in Brussels, from which membership information is available.

Affiliation to the European Foundation for Quality Management is open to companies, supporting organisations and higher institutes of learning based in Europe. Any European company, including business companies, service organizations, public companies and government organisations, can join as a Regular Member. In the case of non-European companies, they must act as an independent subsidiary with a range of business integrated in Europe from full scale research and development to service. Non-profit organizations can join the Foundation as Associated Members.

4.5.2 Purpose

The European Foundation for Quality Management believes that, through Total Quality Management, Europe will become a leading force in the world market. E.F.Q.M.'s objective is to create conditions to enhance the position of European industry by strengthening the role of management in quality strategies.

E.F.Q.M.'s mission is 1) to support the management of Western European companies in accelerating the process of making quality a decisive influence for achieving global competitive advantage; 2) to stimulate and, where necessary, assist all segments of the Western European community to participate in quality improvement activities and to enhance the quality culture.

E.F.Q.M.'s vision is to become the leading organisation for promoting and facilitating TQM in Europe. This vision will be achieved when TQM has become an integrated value of the European society, and European management has achieved a global competitive advantage.

4.5.3 E.F.Q.M Statement on 'why Europe needs quality management'

Achieving — and maintaining — a competitive advantage has become a vital challenge. TQM is now widely recognized as one of the most effective ways to achieve continuous improvement and thus adapt to a changing and increasingly demanding environment. Providing European business with a method to benchmark against the best practices is therefore a top priority for the European Foundation for Quality Management (E.F.Q.M.).

This has led to the development of the E.F.Q.M. model for self-assessment which encompasses all aspects leading to business excellence. Additionally, support has been given by the European Commission to the creation of the European Quality Award.

4.5.4 The European Quality Award

Recognition of achievement is a feature of the policy of E.F.Q.M. and in 1991, with the support of the European Organisation for Quality and the European Commission, it took the lead in establishing the European Quality Award.

The Annual European Quality Award, which was presented for the first time in October 1992 by King Juan Carlos of Spain, incorporates:

- European Quality Prizes awarded to companies to demonstrate excellence in the management of quality as their fundamental process for continuous improvement