



# **BELDEN QUALITY SYSTEM OVERVIEW**

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### 1.0 Introduction

#### 1.1 **Quality System Overview**

The Quality System Overview documents the Quality Management System implemented and maintained by Belden.

Belden manufactures a variety of electronic products. Belden utilizes a formal documented management system to ensure manufactured products meet customer requirements. This is accomplished by deployment of the Quality Policy, and the Quality Management System. The Quality Management System developed and implemented by Belden meets the intent of ISO 9000 series of standards.

The organizational structure pertaining to the quality management system is clearly established within the overall management of Belden. The lines of authority and communication are defined.

The quality system is designed to satisfy customer needs and expectations, meet statutory and regulatory requirements, and continually improve processes and products.

#### 1.2 **References**

ISO 9000 Series  
Agency Standards  
Belden Facility Quality Assurance Manuals

## **2.0 Quality Management System**

### **2.1 General**

Management has established a customer-oriented organization by defining systems and processes that are clearly understood, managed, and improve effectiveness and efficiency.

Activities contributing to quality, whether directly or indirectly, are identified and documented.

- a) General and specific quality responsibilities are explicitly defined;
- b) Responsibility and authority delegated to each activity contributing to quality are clearly established;
- c) Interface control and coordination measures between different activities are defined;
- d) Management delegates the responsibility for internal and external quality assurance audits. The persons so delegated are independent of the activities reported on;
- e) Emphasis is placed on the identification of actual or potential quality problems and the initiation of remedial or preventive measures.
- f) Each facility is responsible for verifying that activities affecting quality are correctly performed and has the authority and organizational freedom to:
  1. Identify root cause of defect;
  2. Initiate, recommend, or provide solutions to provide defect-free products and services;
  3. Verify implementation of solutions, and control further processing, delivery or assembly of a nonconforming item, deficiency, or unsatisfactory condition until proper corrective action has taken place.

### **2.2 Management Responsibility**

The responsibility for and commitment to Belden's quality management system belongs to the Chairman & CEO, Belden, Inc. Management is ultimately responsible for establishing the quality policy and for decisions concerning the initiation, development, implementation, and maintenance of the quality system.

The Director, Quality Assurance is responsible for overall direction, guidance, and assurance of compliance with the ISO 9000 series of standards.

Product and/or service conformance to requirements is the responsibility of each individual in the organization. It is the responsibility of each individual to be knowledgeable about the product or service requirements throughout the performance of their duties.

The facility quality manual defines management policies, objectives and responsibilities. Responsibilities and actions will be listed in the facility quality manual and/or referenced to the applicable department procedure or manuals.

All requirements and provisions adopted by Belden for its quality management system are documented in the form of written policies and procedures.

### **2.3 Customer Focus**

A thorough understanding of the customer's needs at the formulation of the contract, including at the developing stage and in subsequent stages, both internally within Belden and externally with the customer is required. Dialogue is necessary to achieve a clear understanding of the customer's requirements as to the product, delivery, and other critical factors.

The "voice of the customer" encompasses complaints, recommendations, data and information obtained from internal and external customers.

## 2.4 Quality Policy

The Belden policy statement is:

**We, individually and as a team are committed to achieving complete customer satisfaction through continually improving the effectiveness of our Quality Management System.**

**Quality is evident at every stage of our internal and external customer interactions, in every product or system we supply.**

Through oral and written communication, management ensures this policy is understood, implemented, and maintained at all levels of the organization.

## 2.5 Planning and Objectives

Planning is part of Belden's business process for developing strategies, focusing on priorities, and identifying opportunities and risks.

Belden's objective is to continuously improve products, services, and to achieve total customer satisfaction.

Products and services supplied by Belden shall be of consistent quality and shall perform as represented.

1. Quality shall be achieved in the most economical manner.
2. Quality shall be intrinsic to all operations from customer inquiry, order entry, design, manufacture, and delivery.
3. Quality shall be a company-wide responsibility and shall be shared by all employees.
4. Quality improvement shall be a continuous process.

Management is responsible for identifying resource requirements and providing sufficient and appropriate resources essential to achieve quality objectives.

The quality system is organized in such a way that adequate and continuous control is exercised over all activities affecting quality. The management system has emphasized preventive actions while not sacrificing the ability to respond to and correct failures. Operational procedures coordinating different activities are issued and maintained to implement corporate quality policies and objectives. These procedures define the objectives and performance of design, development, procurement, production, and sales. All written procedures have been stated simply, unambiguously, and understandably; and indicate methods to be used and criteria to be satisfied.

## 2.6 Management Review

Management has developed, established, and implemented a management review system which ensures continual suitability, adequacy, and effectiveness of the quality policy and quality management system.

## 3.0 Resource Management

### 3.1 Resources

Resource needs are identified and managed through, but not limited to the following: the budgeting process, management review, customer feedback, design/development process, the annual capital budget process, and the performance and development process). Training course information and educational / training materials are available through the Human Resource department.

### **3.2 Training, awareness, and competency**

Consideration is given to providing training to all levels of personnel within the organization. The need for training of personnel is identified and a method for providing training is established.

All employees are trained in the methods and skills required to perform their duties. Training needs are considered and effectiveness evaluated during the annual performance and development process. Employees are made aware of the proper job performance at all levels.

### **3.3 Facilities/ Work Environment**

Customer requirements, product/process information, supplier information, equipment, software programs, quality data are available to the appropriate departments and facilities. Transfer of this information is contained in procedures and work instructions.

A safe and suitable work environment is provided for all employees. Policies, procedures, and work instructions are available for employees' use. The work environment needed to achieve conformity of products is provided based on production capability, specifications, requirements, regulations, standards, and/or contracts.

## **4.0 Product Realization**

### **4.1 General**

Planning for Product realization structures the operations to achieve desired results and are fulfilled in the following processes:

- a) customer defined requirements and expectations,
- b) design and development,
- c) purchasing,
- d) production operations,
- e) delivery and service.

### **4.2 Customer Related Processes**

All applicable parties have the opportunity to review and understand customer requirements. The following process has been established for determination of requirements related to the product:

1. Review of the contract requirements from the quote stage and at subsequent stages.
2. Achieve agreement within the Belden organization that the requirements have been adequately determined, the requirements are understood, and Belden has the capability to meet contractual requirements.
3. Communicate the results of the reviews with the customer in order to achieve agreement.

This process allows all information pertinent to the quality of a product or service to be analyzed, interpreted, and communicated in accordance with defined procedures.

### **4.3 Design and Development**

The specification and design functions shall provide translation of customer requirements into technical specifications for materials, products, and processes. Product and Specification Engineering will ensure the product to be producible and controllable in the proposed production, installation, or operational conditions.

Management will ensure that design functions provide clear and definite technical data for procurement, the execution of work, and verification and validation of conformance of products and processes to defined requirements. The stages at which design reviews or evaluations take place depend upon the product's application, its design complexity, the extent of innovation and technology introduced, the degree of standardization, and similarity with past proven designs. In addition to customer needs, consideration is given to environmental and other regulations including items in Belden policies that may go beyond existing statutory requirements. The design shall be unambiguous and adequately define important characteristics such as the acceptance and rejection criteria. Both fitness for purpose and safeguards against misuse will be considered.

The methods of measurement and test and the acceptance criteria applied to evaluate the product, and processes during both the design and production phases are specified. The results of all tests and evaluations are documented throughout the qualification test cycle.

The quality management system provides a procedure for controlling the release, change and use of documents for authorizing the necessary changes that may affect product during its entire life cycle.

### **4.4 Purchasing**

Purchased materials, components, and assemblies become part of Belden's product and directly affect the quality of its product. Purchased services, such as calibration and special processes, are also considered. The procurement of purchased supplies is planned and controlled. The purchaser establishes a close working relationship and feedback system with each supplier.

The successful procurement of supplies begins with a clear definition of the requirements. These requirements are contained in the contract specifications, drawings, and purchase orders provided to the supplier. The procuring activity develops appropriate methods to ensure the requirements are clearly defined and communicated and are completely understood by the supplier. These methods include written procedures for preparation of specifications, drawings, and purchase orders, supplier/purchaser conferences prior to purchase order release, and other methods appropriate to the supplies being procured.

Purchasing documents are controlled documents that include precise identification of the product or service and any applicable requirements for testing, inspection, qualification, and packaging. Purchasing documents are reviewed for accuracy and completeness before release. Each supplier will demonstrate a capability to furnish supplies that can meet all the requirements of the specifications, drawings, and purchase order.

A clear understanding and agreement is developed with the supplier on quality requirements for which the supplier is responsible and the method by which conformance to requirements will be verified. Such agreements may also include the exchange of inspection and test data. Systems and procedures are established by which settlement of disputes regarding requirements can be reached with suppliers.

Appropriate receiving quality records will be maintained. In defined instances where required, records of lot identification for the purpose of traceability will be maintained.

## 4.5 Product and Service Provisions

Production operations are to proceed under controlled conditions for materials, production equipment, processes and procedures, personnel, and associated supplies, utilities, and environments. Production operations are specified by documented work instructions. Workmanship standards are defined to the necessary extent by written standards, photographs, and/or physical samples.

Verification and validation of a product, process, material or environment is performed at critical points in the production sequence. The use of control charts and statistical sampling procedures and plans facilitate production/process control. Verification at each stage relates directly to finished product specifications or to an internal requirement. If verification of the process variables is not physically or economically feasible, the verification will depend primarily on the finished product characteristics.

Production processes are verified as being capable of producing product in accordance with product specifications. Appropriate control is established to ensure characteristics remain within specification or appropriate modifications, or changes are made. All in-process and final inspections are planned and specified. Documented test and inspection procedures are maintained.

Where environmental conditions such as temperature, humidity, or cleanliness are important to a product quality, appropriate limits are specified, controlled, and verified.

Those responsible for authorization of process and process changes are clearly designated and, where necessary, customer approval is sought. All changes to production tooling or equipment, materials or processes are documented. Belden product is evaluated after any modification to verify the modification instituted has the desired effect upon product requirements. Any changes in the relationships between process and product characteristics resulting from the modification will be documented and appropriately communicated.

Appropriate identification is maintained throughout the production process to delivery. The marking and labeling of materials are legible and durable. Identification remains intact from the time of initial receipt to delivery to the final destination. Markings are adequate to identify a critical product for post delivery issues such as in the event of a recall or special inspection becomes necessary.

Customer supplied product is product owned by the customer and upon delivery, Belden accepts responsibility for prevention from damage and for identification, maintenance, storage, handling, and use while the product is in our possession.

Materials and parts conform to appropriate specifications and standards before being introduced into production. Materials are appropriately identified, stored, segregated, handled, packaged, and protected. The handling of materials requires proper planning, control, and a documented system for incoming materials, material in process, and finished goods.

Sufficient control is maintained over all measurement systems used in the development and production of a product to provide confidence in decisions or actions based on measurement data. Control is exercised over gauges, instruments, sensors, special test equipment, and related computer software. In addition, manufacturing jigs, fixtures and process instrumentation, which can affect the specified characteristics of a product or process, are suitably controlled. Procedures are established to monitor and maintain the measurement process itself under statistical control, including equipment, procedures, and operator skills. Measurement error is compared with requirement and appropriate action taken when precision and/or bias requirements are not achieved. The control of measuring and test equipment and procedures extends to all suppliers furnishing goods and services.

Where measuring processes are found to be out of control or where measuring and test equipment is found to be outside the required calibration limits, corrective action is necessary. Evaluation is made to determine the effects on completed work and to what extent reprocessing, retesting, recalibration or complete rejection may be necessary. In addition, investigation of cause is required in order to avoid recurrence. The facilities of outside organizations may be used for measurement, testing, or calibration services, provided the requirements in traceability and corrective action are satisfied.

## 5.0 Measurement, Analysis, and Improvement

### 5.1 Measurement and Monitoring

Belden management reviews the effectiveness of the quality management system through executive management reviews, manufacturing quality level management reviews, corrective action response meetings, and internal audits.

An electronic customer satisfaction system has been established for reporting instances of product failure or shortcomings. The system is designed to analyze, as a continuous operation, the degree to which the product or service satisfies customer expectations including safety and reliability. Information on complaints, the occurrence and modes of failure, customer needs and expectations, or any problem encountered in use are made available for design review and corrective action in the supply and/or use of the item.

All elements, aspects, and components pertaining to the quality management system are internally audited and evaluated on a regular basis. Audits are carried out to determine whether various elements within the quality management system are effective in achieving stated objectives. Audit findings, observations, and recommendations, are submitted for review by appropriate members of Belden management. Personnel performing audits of quality management system are independent of the specific activities or areas being audited.

Belden management makes provisions for third party review and evaluations of the quality management system. Findings, conclusions, and recommendations, reached as a result of this review and evaluation are submitted for review by appropriate members of Belden management.

Inspections or tests are considered at appropriate points in the process to verify conformance. Location and frequency depends on the importance of the characteristics and ease of verification at the stage of production. Verification is made as close as possible to the point of production of the feature or characteristic.

To augment inspections and tests made during production, two forms of final verification of completed product are available. Either or both of the following may be used, as appropriate:

- a) Acceptance inspections or tests may be used to ensure items or lots produced have met performance and other defined requirements. Reference may be made to the purchase order to verify the product to be shipped agrees in type and quantity;
- b) Product quality auditing of sample units selected as representative of completed production costs may be either continuous or periodic.

Acceptance inspection and product auditing may be used to provide rapid feedback for corrective action on product and process. Deficiencies or deviations should be reported and reworked or repaired. Modified products will be re-inspected or retested.

The method used to ensure quality of purchased materials, component parts, and assemblies which are received into the production facility depends on the importance of the item, the state of control, and information available from the supplier and impact on costs.

Application of statistical methods is an important element at all stages in the quality system.

Specific statistical methods and applications available include, but are not limited to, the following:

- a) Design of experiments/factorial analysis;
- b) Analysis of variance/regression analysis;
- c) Safety evaluation/risk analysis;
- d) Tests of significance;
- e) Quality control charts;
- f) Statistical sampling inspection.

## **5.2 Control of Nonconformity**

The steps for dealing with nonconforming items are set out in documented procedures with examples of the format of markers, forms, and reports. Appropriate steps are taken to prevent the recurrence of nonconformance.

Perceived nonconforming items or lots are immediately identified and the occurrence(s) recorded. Whenever possible, provision is made as necessary to examine previous production lots. The nonconforming items are segregated from conforming items and identified to prevent further use until appropriate disposition.

Nonconforming items are subjected to review by designated persons to determine fitness for use as they are or whether they shall be repaired, reworked, reclassified or scrapped. Persons carrying out the review will be competent to evaluate the effects on nonconformity of interchangeability, further processing, performance, reliability, safety and aesthetics. Disposal of nonconforming items will be made as soon as practicable in accordance with procedures. Decisions to "pass" an item will be accompanied by authorized concessions/waivers.

## **5.3 Continual Improvement**

A system is established to continually improve the effectiveness of the quality management system through the use of the quality policy, quality objectives, audit results, analysis of data, corrective and preventive action, and management review.

## **5.4 Corrective Action**

The implementation of corrective action begins with the detection of nonconformance and involves taking measures to eliminate or minimize the recurrence. Corrective action also presupposes the repairing, reworking, recalling or scrapping of unsatisfactory materials or items.

The responsibility and authority for instituting corrective action is defined as part of the quality system. The coordinating, recording, and monitoring of corrective action related to all aspects of the organization or a particular product is assigned to a particular function within the organization. However, the analysis and execution may involve a variety of functions such as sales, design, manufacturing, engineering, production, and quality control.

The significance of a problem affecting quality is evaluated in terms of its potential impact on performance, reliability, safety, and customer satisfaction. In the analysis of a problem, the root cause is determined before preventive measures are planned.

Permanent changes resulting from corrective action are recorded in work instructions, manufacturing processes, and product specifications.

## **5.5 Preventive Action**

Preventive action is initiated to a degree appropriate to the potential problems. Sufficient controls of processes and procedures are implemented to prevent recurrence of the problem. Their effects are monitored in order to ensure conformance to desired goals.