Global Quality Management System Supplement for the Telecommunications Industry Model, TL 9000 Requirements Handbook, Release 5.0

1. SCOPE

1.1. Content

This specification defines the telecommunications industry Quality Management System requirements in accordance with TL 9000 Requirements Handbook, Release 5.0. In addition, this document is a supplement to Quality Specification, TEC-1000 in providing criteria for compliance to telecommunications industry requirements.

Alignment to Quality Specification TEC-1000 is achieved through the ISO 9001: 2008 paragraph tables which address each applicable TL 9000 requirement. Applicable requirements include TL 9000 specific requirements tagged with a product scope identifier related to hardware and/or services. These identifier codes include:

- C for common (H, S, and V)
- HS for hardware and software
- HV for hardware and services
- H for hardware only

Software Only (S) and Services Only (V) product scope identifiers are excluded based upon the products associated with the Tyco Electronics TL 9000 Quality Management System certifications.

These certifications are all relative to the current release of the TL 9000 Quality Management System Measurement Handbook Product Category Code 3, Transmission Systems.

1.2. Application

This specification applies to all Business Units of Tyco Electronics. In recognition of the varying organizational structures and needs, Business Units may develop and use supporting specifications and/or procedures. However, such supporting documentation shall not conflict with or supersede this specification.

2. APPLICABLE DOCUMENTS

The following documents constitute a part of this specification to the extent specified herein. Unless otherwise specified, the latest edition of the document applies.

2.1. Specifications

A.	TEC-1000	Tyco Electronics Global Quality Management System
B.	TEC-1002	Tyco Electronics Complaint Handling System (TECHS)
C.	TEC-1003	Supplier Performance Reporting and Continual Improvement Process
D.	TEC-1005	Tyco Electronics Total Quality Management Requirements for Suppliers
E.	TEC-1006	Approval of Suppliers

2.2. Industry Standards

A.	TL 9000	Quality Management System Requirements Handbook, Release 5.0
B.	TL 9000	Quality Management System Measurements Handbook, Current Release
C.	ISO 9001:2008	Quality management systems – Requirements
D.	ANSI/ESD S20.20 – 2007	Electrostatic Discharge Control Program Standard

* Trademark
| Indicates change

3. DEFINITIONS

Definitions contained in the above mentioned Specifications and Industry Standards are applicable herein.

NOTE *On all subsequent pages, **Bold Text** in the right hand column represents Tyco Electronics commentary.*

4. QUALITY MANAGEMENT SYSTEM (QMS)

TEC-1000		SUPPLEMENTARY TL 9000 REQUIREMENTS	
4.1.	**QMS – General Requirements**	4.2.3.C.1.	Control of Customer Supplied Documents and Data
4.2.	**Documentation Requirements**		The organization shall establish and maintain a documented procedure(s) to control all customer-supplied documents and data (e.g., network architecture, topology, capacity, installation termination assignments, drawings, and database) if these documents and data influence the realization and/or support the product. **Customer supplied documents that can influence the design, verification, validation, inspection, testing, or servicing of the product shall be controlled in accordance with established and maintained procedures. Typically, the Design Engineering function will maintain responsibility for ensuring that the proper revision of the customer drawings and specifications and defining specific performance parameters for the product being designed are stored and made available when required. When the product is released for production, the customer document(s) that influenced the design shall be retained as design history.**
4.2.1.	**Documentation Requirements - General**		
4.2.2.	**Quality Manual**		
4.2.3.	**Document and Data Control**		
4.2.3.1.	**Initial Issue**		
4.2.3.2.	**Changes**		
4.2.3.3.	**Drawings, Standards, and Specifications**		
4.2.4.	**Control of Quality Records**		

5. MANAGEMENT RESPONSIBILITY

TEC-1000		SUPPLEMENTARY TL 9000 REQUIREMENTS	
5.1.	**Management Commitment**	5.2.C.1.	Customer Relationship Development
5.2.	**Customer Focus**		Top management shall demonstrate active involvement in establishing and maintaining mutually-beneficial relationships between the organization and its customers. **Tyco Electronics' top management welcomes the opportunity to meet with customers for the purpose of establishing and maintaining mutually beneficial relationships. These meetings are intended to share expectations, understand customer perceptions, solicit and consider customer input, and ensure quality improvement with the aim of enhancing overall customer satisfaction.** **While top management maintains accountability for establishing and maintaining mutually-beneficial customer relationships, the Sales and Marketing functions typically initiate these customer meetings. They will request participation from other applicable functions depending on the agenda for the meeting. Additionally, the opportunity to host customer representatives in our manufacturing and engineering facilities frequently results in a better mutual understanding of customer requirements and supplier capabilities.** **The various organizational structures and entities, such as teams, account management, industry management and customer service are deployed by top management to align our internal capabilities with the needs of our customers. (TEC-1000)**
		5.2.C.2.	Customer Communication Methods
			The organization shall establish and maintain methods for communicating with selected customers to share expectations and to ensure product quality improvement. The outcome of customer communication should generate actions for resolving identified issues and promote opportunities for improving customer satisfaction. **NOTE** *It is recognized that it is not possible for an organization to provide the same level of communication with all its customers. The level provided may depend on the amount of business with the customer, the history of problems, customer expectations, and other factors.*

TEC-1000		SUPPLEMENTARY TL 9000 REQUIREMENTS	
			The Sales and Marketing function shall identify strategic accounts and assign appropriate resources to manage key customers. The strategic accounts shall be documented and made available to customer service, engineering, business and industry units, and top management. Customers shall be selected and prioritized based on strategic business plans. The selection and communication process with customers may be based on the current amount or potential amount of business, history of problems, customer expectations, contractual obligations or other applicable criteria. Information collected from these customers shall be used to prioritize resources, adjust plans and improve overall customer satisfaction as appropriate. **The Sales and Marketing function shall ensure that customer requirements and expectations are clearly defined and agreed upon. Any additional requirements or expectations not identified in the contract review process must be communicated to the appropriate engineering, manufacturing or quality organization. Reviews shall be conducted with strategic customers covering the status of agreed upon requirements and expectations and tracking resolution of issues.**
5.3. **5.4.** **5.4.1.** **5.4.2.**	**Quality Policy** **Planning** **Quality Objectives** **QMS Planning**	5.4.1.C.1.	Quality Objectives
			Objectives for quality shall include targets for the TL 9000 measurements defined in TL 9000 Quality Management System Measurements Handbook. **Top management shall establish quality objectives and performance measures that address customer expectations. These quality objectives and goals shall include the applicable TL 9000 product category measurements as defined in the TL 9000 Quality Management System Measurements Handbook. Documented procedure(s) shall be established and maintained defining the responsibilities, data sources, and QuEST Forum data submission process.** **Performance against the goals that are established for the applicable TL 9000 measurements will be monitored at the top management level.**
		5.4.2.C.1.	Long and Short Term Quality Planning
			The organization's quality planning activities shall include long and short term plans with goals for improving quality and customer satisfaction. The plans shall address business factors relevant to the organization and its customers, including performance objectives established jointly with selected customers. Performance to these goals shall be monitored and reported to top management.

TEC-1000	SUPPLEMENTARY TL 9000 REQUIREMENTS	
		NOTE 1 *Examples factors which might be considered for planning are cycle time, customer service, training, cost, delivery commitments, product reliability, and sustainability.* **NOTE 2** *Top Management should demonstrate their active involvement in long and short term quality planning.* **Top management shall establish top level quality objectives and performance goals for improving quality and customer satisfaction on an annual basis in accordance with the Tyco Electronics fiscal year. Long term plans to achieve these annual performance goals shall be established and documented. Periodic performance reviews may result in long term plan adjustments or short term plans. Performance to these goals shall be monitored and reported at an established interval.**
	5.4.2.C.2.	Customer Input
		The organization shall implement methods for soliciting and considering customer input for quality planning activities. The organization should establish joint quality improvement programs with customers. **The customer relationship development and communication processes provide a method for soliciting customer inputs regarding the establishment of appropriate quality objectives and goals. As determined through direct communication with key strategic customers, joint quality improvement programs may be implemented.**
	5.4.2.C.3.	Supplier Input
		The organization shall implement methods for soliciting and using supplier input for quality planning activities. **Supplier inputs are acquired through the continual improvement process for the supply chain management system. Strategic suppliers are selected based on a willingness to work in a cooperative and collaborative way in order to achieve mutual long term benefits. These key suppliers participate with Tyco Electronics in cost management and performance improvements.**

TEC-1000		SUPPLEMENTARY TL 9000 REQUIREMENTS	
5.5.	**Responsibility, Authority and Communication**	5.5.3.C.1.	Organization Performance Feedback
5.5.1.	**Responsibility and Authority**		The organization shall inform employees of its quality performance and the level of customer satisfaction, including the results of quality management system reviews. **NOTE** *Sensitive organizational information may be excluded from this requirement.* **Top management shall promote awareness of the quality policy, disseminate progress on quality performance and customer satisfaction and changes in the quality management system.** **This promotion may include activities such as meetings of key personnel, Tyco Electronics Intranet sites, videotapes, voice message announcements, newsletters, training programs, status reports, daily interactions, group meetings, and customer contact.**
5.5.2.	**Management Representative**		
5.5.3.	**Internal Communication**		
5.6.	**Management Review**		
5.6.1.	**General**		
5.6.2.	**Review Input**		
5.6.3.	**Review Output**		

6. RESOURCE MANAGEMENT

TEC-1000		SUPPLEMENTARY TL 9000 REQUIREMENTS	
6.1.	**Provision of Resources**	6.2.2.C.1.	Internal Course Development
6.2.	**Human Resources**		Where the organization is responsible for developing internal training courses, the organization shall establish and maintain methods to ensure consistency in course planning, development, and delivery. **When appropriate, a method to ensure the consistency in the planning, development, and implementation of internally developed training courses shall be deployed.**
6.2.1.	**General**	6.2.2.C.2.	Quality and Process Improvement Concepts
6.2.2.	**Competence, Training and Awareness**		Those employees that have a direct impact on the quality of the product, including top management, shall be trained in and apply the fundamental concepts of continual improvement, problem solving, and customer satisfaction. **To ensure that there is an awareness of the importance of quality, employees who have a direct impact on the quality of the products, including the top management, shall be trained in the fundamental concepts of quality improvement, problem solving and customer satisfaction.**
6.2.2.1.	**Human Resources Function**	6.2.2.C.3.	Product Quality Training Opportunity Awareness
6.2.2.2.	**Qualification Training**		Where training that affects product quality is required, the organization shall implement methods to ensure employees are enabled to participate. Methods should address communication of training opportunities and availability of training. **Training requirements shall be defined for all employees. Employees shall be made aware of their individual training needs and opportunities.**
6.2.2.3.	**Training Effectiveness**	6.2.2.C.4.	Electrostatic Discharge (ESD) Training
			All employees with functions that involve handling, storage, packaging, preservation, or delivery of ESD-sensitive products shall receive training in ESD protection prior to performing their jobs. The type and frequency of ESD refresher training shall be defined by the organization. **Employees involved in the handling of ESD-sensitive products shall have their training needs identified and receive formal and documented instruction in ESD protection. Periodic refresher training shall be defined.**
		6.2.2.C.5.	Advanced Quality Training
			The organization shall offer appropriate levels of advanced quality training. Examples of advanced training may include statistical techniques, process capability, statistical sampling, data collection and analysis, problem identification, problem analysis, and root cause analysis.

TEC-1000		SUPPLEMENTARY TL 9000 REQUIREMENTS	
			The Tyco Electronics Intranet, under the Human Resources website, includes a catalog of available training courses. The training course guide provides descriptions of training options which includes introductory through advanced courses on quality subjects.
		6.2.2.C.6.	Hazardous Conditions Training Content
			Where the potential for hazardous conditions exists, training content shall include task execution, personal safety and appropriate protective equipment, awareness of hazardous environment, and equipment protection. **As determined, the potential existence of hazardous conditions will be addressed through the initiation of 'hazard assessments', the training of affected personnel, and the implementation of controls such as Personal Protective Equipment (PPE).**
		6.2.2.HV.1.	Qualification of Personnel
			The organization shall establish personnel qualification and requalification requirements for all applicable processes. Qualification requirements shall address employee education, experience, training, and demonstration of skills. **NOTE** *Examples of processes which may require personnel qualification and requalification include wire wrapping, soldering, welding, fiber optic fusion splicing, and laboratory processes.* **Job training shall be provided for personnel, including contract or agency personnel, in any new or modified job affecting product quality. Local Business Unit management shall establish operator qualification and requalification requirements as appropriate. Requirements for qualification shall, at a minimum, address employee education, experience, training, and demonstrated competency.**
6.3.	**Infrastructure**	6.3.C.1.	Infrastructure
			The organization shall identify critical areas of the infrastructure and provide for the security needed to protect these areas.

TEC-1000		SUPPLEMENTARY TL 9000 REQUIREMENTS	
			Each Tyco Electronics facility shall coordinate security to ensure that critical infrastructure areas are protected. The security plan elements may include: • **Conspicuously displayed employee badges,** • **Card key access with security classifications,** • **Password access to computers and protected files, and** • **Visitor badges and registers.** **Periodically, the security plan elements shall be assessed to ensure their continued effectiveness.**
6.4.	**Work Environment**	6.4.C.1.	Work Areas
			Areas used for handling, storage, and packaging of products shall be clean, safe, and organized to ensure that they do not adversely affect product quality or personnel performance. **Facilities, including workstations and associated equipment, shall be maintained in a state of order, cleanliness, and repair such that they do not adversely affect product quality or personnel performance. All work areas must comply with established safety, regulatory and environmental standards and codes. (TEC-1000)**

7. PRODUCT REALIZATION

TEC-1000		SUPPLEMENTARY TL 9000 REQUIREMENTS	
7.1.	**Planning of Product Realization**	7.1.C.1.	Life Cycle Model
7.1.1.	**New Product Introduction**		The organization shall establish and maintain an integrated set of method(s) that covers the life cycle of its products. The method(s) shall contain, as appropriate, the processes, activities, and tasks involved in the concept, definition, development, introduction, production, operation, maintenance, and disposal of products, spanning the life of products. **NOTE 1** *A Life Cycle Model may include consideration and development of alternative solutions evaluated against selected criteria.* **NOTE 2** *The Life Cycle Model should take into consideration sustainability practices such as reduction of energy and resource consumption, ecologically-responsible disposal and proper end-of-life treatment.* **NOTE 3** *The new product introduction methods should include provisions for such programs as quality and reliability prediction studies, pilot production, demand and capacity studies, sales and service personnel training, customer documentation and training, and new product post-introduction evaluations.* **Tyco Electronics has developed a set of guidelines to model the activities required to take customer requirements, convert them into deliverable products, manufacture and maintain the integrity of the products, and discontinue the products as customer demands change.**
7.1.2.	**Disaster Recovery Planning**	7.1.C.2.	Disaster Recovery
			The organization shall establish and maintain documented plans for disaster recovery and security restoration (see 6.3.C.1) to ensure the organization's ability to recreate and service the product throughout its life cycle. Disaster recovery plans shall include, at a minimum, crisis management, business continuity, and information technology. Disaster recovery and security restoration plans shall be periodically evaluated for effectiveness and reviewed with appropriate levels of management.

TEC-1000	SUPPLEMENTARY TL 9000 REQUIREMENTS	
		NOTE *Types of recovery capabilities should include a series of action statements related to disaster recovery. Examples include who is notified, under what circumstances are they notified, who has authority to act, and who will continue the steps outlined in the plan* **Business recovery plans are developed and maintained at the facility level to ensure the ability to maintain product and service continuity in the event of a disaster. These plans shall include contingencies in the event of an emergency such as utility interruptions, labor shortages, and key equipment failure and reasonably protect the customer's supply of product. (TEC-1000)**
	7.1.C.3.	End of Life Planning
		The organization shall establish and maintain a documented procedure(s) for the discontinuance of manufacturing and/or support of a product. The documented procedure(s) should include • Cessation of full or partial support after a certain period of time, • Archiving product documentation and software, • Responsibility for any future residual support issues, • Transition to the new product, if applicable, • Accessibility of archive copies of data, and • Disposition of the organization's parts and assemblies. **Tyco Electronics has established and maintained procedure(s) defining the requirements for customer and agency notifications related to product changes, manufacturing location changes, product discontinuance, and the disposition of discontinued products.**
	7.1.C.4.	Tools Management
		The organization shall ensure that internally developed software and/or tools used in the product life cycle are subject to the appropriate quality method(s). **NOTE** *Examples of tools to be considered include: design and development, testing, configuration management, documentation, scripts, customizations, dies, stamps, fixtures, and diagnostic tools, as well as software used to build and test product.* **Tools management is maintained through the applicable approval and change control processes as well as the verification of test, measuring, and monitoring tools.**

TEC-1000	SUPPLEMENTARY TL 9000 REQUIREMENTS	
	7.1.HS.1	Configuration Management Plan
		The organization shall establish and maintain a configuration management plan, which should include • Identification and scope of the configuration management activities, • Schedule for performing these activities, • Configuration management tools, • Configuration management methods and documented procedure(s), • Organizations and responsibilities assigned to them, • Level of required control for each configuration item, and • Point at which items are brought under configuration management. **NOTE** *The Configuration Management Plan need not be contained in a single document.* **The Tyco Electronics configuration management plan is established and maintained through various documented procedures where responsibilities and authorities are outlined. The scope of the configuration management process includes:** • **Document and data control which addresses the identification, protection, approval, and availability of current issues of all pertinent product and project related documents including designs, specifications, plans, and schedules.** • **Design changes which require that each design change be traceable to an appropriate source and approval.** • **Product identification and traceability which requires that each version of a configuration item be identified by some appropriate means.** • **Inspection and test status which requires procedures to identify what verification steps and tests have been achieved by the product or product components at each phase in the defined life cycle.** • **Nonconforming product control which requires procedures to ensure that untested, defective, or incorrect versions of the product are not inadvertently used.**

TEC-1000		SUPPLEMENTARY TL 9000 REQUIREMENTS	
7.2.	**Customer Related Processes**	7.2.2.C.1	Closure Tracking
7.2.1.	**Determination of Product Related Requirements**		All actions resulting from requirements reviews shall be tracked to closure. **The appropriate functions responsible for verifying that the customer request can be satisfied shall review the purchase order, request for quote, drawing or specification. Appropriate action shall be initiated to resolve differences to ensure satisfaction of contractual requirements before acceptance of the order. This verification shall include a consideration of verbal and electronic ordering methods as well as a means to convey changes to existing order requirements. Amendments to contracts shall be reviewed and appropriate actions shall be initiated to resolve any differences. (TEC-1000)**
7.2.2.	**Review of Product Related Requirements**	7.2.2.C.2.	Contract Review
7.2.2.1.	**Customer Service**		The organization shall establish and maintain a contract review process that should include • Product acceptance criteria and criteria review process, • Method(s) for handling problems detected after product acceptance, including customer complaints, • Plan(s) for removal and/or correction of nonconformities after applicable warranty period or during product maintenance contract period, • Identification of risks and possible contingencies, • Adequate protection of proprietary information, • Definition of the organization's responsibility with regard to outsourced work, • Activities carried out by customer, including the customer's role in requirements, specifications and acceptance, • Facilities, tools, and software items to be provided by the customer, and • All referenced standards and procedures. **NOTE** *Product acceptance criteria should include, as appropriate,* • *Documented test procedure(s),* • *Test environment,* • *Test cases,* • *Test data,* • *Test responsibilities,* • *Resources involved, and* • *Required acceptance test reports.*
7.2.2.2.	**Customer Specification Review**		

TEC-1000		SUPPLEMENTARY TL 9000 REQUIREMENTS	
			The review of customer specifications shall include as appropriate: • **Determining product compliance with the customer's requirements and the initiation of the cross-reference process as applicable,** • **Determining compliance to those quality requirements that include measurement data, performance criteria, verification requirements, customer special requirements, audit parameters, and processing customer complaints,** • **Determining compliance to special labeling and packaging requirements,** • **Determining compliance to the delivery requirements, and** • **Contract administration and legal department review of any contract documents containing other than Tyco Electronics standard terms and conditions. (TEC-1000)**
7.2.3.	**Customer Communication**	7.2.3.C.1.	Notification About Problems
			The organization shall establish and maintain a documented procedure(s) to notify all customers who may be affected by a Critical Problem Report. **Tyco Electronics has established and maintained procedure(s) defining the communication mechanisms for notifying and reporting any material, product, or process nonconformance that affects our customers. The process may be known as "quality alerts" and defines the requirements and responsibilities for issuing customer notifications, tracking acknowledgements, and resolving associated corrective actions.**
		7.2.3.C.2	Problem Severity Classification
			Except for those products specifically excluded from severity level reporting, the organization shall assign severity levels to customer-reported problems based on the impact to the customer in accordance with the definitions of critical, major, and minor problem reports contained in the TL 9000 Quality Management System Measurements Handbook. The severity level shall be used in determining the timeliness of the organization's response. **NOTE** *The customer and the organization should jointly determine the priority for resolving customer-reported problems.*

TEC-1000	SUPPLEMENTARY TL 9000 REQUIREMENTS	
		A subset of data from the Tyco Electronics Quality Management System is used to support the TL 9000 data submission process. The definitions and calculations are derived from the current version of the TL 9000 Quality Management Systems Measurement Handbook. The Tyco Electronics data, including the NPR categories for number of problem reports and FRT categories for problem report fix response time, is extracted from the Tyco Electronics Database (TED) and sent electronically to the University of Texas at Dallas (UTD).
	7.2.3.C.3	Problem Escalation
		The organization shall establish and maintain a documented escalation procedure(s) to resolve customer-reported problems. **Tyco Electronics Quality Specification TEC-1002, Tyco Electronics Complaint Handling System (TECHS), includes a defined escalation process to ensure the timeliness and effectiveness of establishing and implementing corrective actions.**
	7.2.3.C.4.	Problem Report Feedback
		The organization shall provide the customer with feedback on their problem reports in a timely and systematic manner. **Tyco Electronics Quality Specification TEC-1002, Tyco Electronics Complaint Handling System (TECHS), defines the requirements for customer complaints including customer approval of complaint related corrective actions.**
	7.2.3.HS.1.	Product Replacement
		The organization shall establish and maintain a documented procedure(s) for identifying and replacing products that are unfit to remain in service.

TEC-1000	SUPPLEMENTARY TL 9000 REQUIREMENTS	
		In the interest of both customers and Tyco Electronics, customers will be notified if suspect or confirmed nonconforming product has been delivered. When determined, the applicable organizational quality manager will coordinate internal communications between the appropriate internal parties to discuss the situation and develop a plan to notify the affected customer(s) and implement a solution. **The quality manager shall coordinate the decision and plan and determine who shall participate in contacting the customer. Typical solutions may include:** • **Sort by the customer at their site. Return only the defective product.** • **Sort at the customer site by contracted resources. Return only the defective product.** • **Sort at customer site by personnel from the manufacturing unit. Return only the defective product.** • **Return to Tyco Electronics for quick turnaround sorting or immediate replacement with conforming product.** **In addition, the manner for managing nonconforming product for internal and external use is defined procedurally and includes the process for obtaining temporary approval to deviate product or processes when conformance or compliance to documented requirements cannot be achieved. User notification and approval is obtained through a structured deviation process.**
	7.2.3.HS.2.	Design and Development Process Quality Measurements Data Reporting
		On request by the customer, communications shall include reporting and evaluation of a jointly agreed set of design and development process measurements. **The Sales and Marketing function is the primary interface for ensuring that all customer requests for information are satisfied. If agreed upon design and development measurements are requested, the Engineeirng function will establish a process for measuring and communicating results to the customer.**

TEC-1000		SUPPLEMENTARY TL 9000 REQUIREMENTS	
7.3.	**Design and Development**	7.3.1.C.1.	Project Plan
7.3.1.	**Design and Development Planning**		The organization's project planning activities shall be based on the defined product life cycle model. The project plan should include • Project organizational structure, • Roles, responsibilities, and accountabilities of the project team, • Roles, responsibilities, and accountabilities of related teams or individuals, within and outside the organization, and interfaces between them and the project team, • Means for scheduling, tracking, issue resolution, and management reporting, • Budgets, staffing, and schedules associated with project activities, • Identification of method(s), standards, documented procedure(s), and tools to be used (if such items are clearly defined as part of the product life cycle model, a reference to that life cycle model is sufficient), • References to related plans (e.g., risk management, development, testing, configuration management, and quality), • Project specific development or service delivery environment and physical resource considerations (e.g., resources to address development, user documentation, testing, operation, required development needs, secure computing environment, lab space, workstations, etc.), • Customer, user, and supplier involvement during the product life cycle (e.g., joint reviews, informal meetings, and approvals), • Management of project quality, including appropriate quality measures, • Design for 'x' plans as appropriate to the product life cycle (Plan examples include, but are not limited to, Manufacturability, Reliability, Regulatory, Serviceability, Safety, Sustainability, and Traceability.), • Lessons learned from previous post-project analyses, • Project specific training requirements, • Required certifications (e.g., product certifications or employee technical certifications), • Proprietary, usage, ownership, warranty, licensing rights, and • Post project analysis and improvement activities, including root cause analysis of project lessons learned, and corrective actions to be taken to preclude repetition in future projects.
7.3.1.1.	**Project Planning**		

TEC-1000	SUPPLEMENTARY TL 9000 REQUIREMENTS
	NOTE 1 *The project plan and any related plans may be an independent document, a part of another document, or comprised of several documents.* **NOTE 2** *Work instructions defining tasks and responsibilities common to all development projects need not be replicated as part of a project plan.* **Timely project plans shall be prepared by engineering management that identify the responsibility, budgets, staffing and schedules for each design and development activity. The plans shall be updated and communicated to the appropriate individuals as each design evolves. The plans, based on the life cycle model, shall describe or reference the following activities, as applicable:** • **Organizational and technical interfaces between different groups (internal and external) shall be identified and the necessary information documented, transmitted, and reviewed;** • **Project roles and responsibilities;** • **Project management quality measures;** • **Project reporting requirements, including tracking and resolving open issues;** • **Risk management and contingency plans;** • **Performance, manufacturability, reliability, regulatory, safety, security, serviceability, sustainability, traceability, and other critical requirements;** • **Any project specific training requirements;** • **Previous post project analysis lessons;** • **Usage or licensing rights;** • **Post project analysis and improvement opportunities including corrective actions on lessons learned.**
	7.3.1.C.2 Requirements Traceability
	The organization shall establish and maintain a method to trace documented requirements through design and test. **NOTE** *The organization should establish communication methods for dissemination of product requirements and changes to requirements to all impacted parties identified in the project plan.*

TEC-1000	SUPPLEMENTARY TL 9000 REQUIREMENTS	
		Product design and development requirements are documented and controlled throughout the design and development process to ensure consistency from the establishment of design objectives through product validation testing. Any changes to product requirements will be communicated to impacted parties, including customers, through planned and periodic design project meetings and the design review process.
	7.3.1.C.3.	Test Planning
		Test plans shall be documented and should include • Scope of testing (e.g., unit, feature, integration, system, acceptance, field, migration and regression), • Types of tests to be performed (e.g., functional, boundary, usability, performance, regression, interoperability, stress), • Traceability to requirements, • Test environment (e.g., relevancy to customer environment, operational use), • Test coverage (degree to which a test verifies a product's functions, sometimes expressed as a percent of functions tested), • Expected results, • Data definition and database requirements, • Set of tests, repeatable test causes (e.g., inputs, outputs, test criteria), and documented test procedure(s), • Use of external testing, • Method(s) of reporting and resolving defects, Customer test requirements, and • Predefined exit criteria. The results of testing and subsequent action taken shall be recorded. **Product design verification and validation testing is performed to an established, controlled, and documented test plan to ensure:** • **A defined test scope with product descriptions, corresponding part numbers, and the latest versions of design objectives and product specifications, including exit criteria;** • **Test specimens are identified and representative of normal production lots with Certificates of Conformance required for design validation/product qualification testing;** • **A test sequence is defined including the order of tests, examinations, and groupings;** • **A description of each test, including environmental considerations, with defined acceptance criteria;** • **A description of test methods including references to applicable external requirements.**

TEC-1000	SUPPLEMENTARY TL 9000 REQUIREMENTS
	7.3.1.C.4. Risk Management Plan

The organization shall develop and document a plan for the identification, analysis, and control of risks to the project that can impact cost, schedule, product quality, or product performance.

NOTE

Risk Management should be performed during all phases of product development and should include:

- *The means to determine risk sources, categories, and priorities;*
- *Identification of significant or critical characteristics and failure modes, including customer experience;*
- *A definition of risk parameters (e.g., probability of occurrence, severity of impact) to be used in determining risk priorities and any scoring mechanisms to be used (e.g., FMEA – Failure Mode Effects Analysis);*
- *How risks will be managed (e.g., tools to be used, actions to reduce risk, migration strategies, monitoring and reporting requirements);*
- *Inputs from appropriate functional disciplines, and*
- *A mechanism for capturing and applying lessons learned.*

Risk management planning is integrated into the Tyco Electronics project management approach and includes the analysis and control of identified risks. Processes are established and maintained for identifying risks, evaluating risks, controlling risks, and evaluating the effectiveness of implemented controls. These processes may use one or more of the basic and advanced quality tools (such as design of experiments (DOE), failure mode and effects analysis (FMEA), statistical tolerance analysis, CDOV, etc).

Various processes addressing risks and opportunities are incorporated into the project review checklists. Projects also incorporate a post project analysis to determine and document lessons learned.

TEC-1000	SUPPLEMENTARY TL 9000 REQUIREMENTS	
	7.3.1.C.5	Integration Planning
		The organization shall develop and document a plan to integrate the hardware, software, and/or service components into the product to ensure they interact as designed. The plan shall include • Methods and documented procedure(s); • Responsibilities; • Schedule for integration, and • Test requirements. **Integration planning is incorporated into project plans which clearly reflect the processes, timelines, and functional responsibilities required for project completion. Project plans shall define responsibilities related to design, test, and product maintenance after release to production and change control authorities.**
	7.3.1.C.6	Estimation
		The organization shall establish and maintain a method for estimating and tracking project factors against the project plan throughout the project life cycle. **NOTE** *Project factors should include project size, complexity, requirements changes, effort, staffing, schedules, cost, quality, reliability, and productivity. Data from the estimation process should be analyzed to compare original estimates to actuals.* **Project plans shall be prepared that identify the responsibility, budgets, staffing, and schedules for each established project activity. Project plan factors shall be tracked, evaluated, updated, and communicated to the appropriate individuals throughout the project life cycle.**
	7.3.1.HS.1	Migration Planning
		The organization shall develop and document a migration plan when a system, hardware or software product is planned to be migrated from an old to a new operational environment. If the old environment will no longer be supported, users shall be given notification of migration plans and activities which shall include a description of the new environment with its date of availability, and a description of other support options available, if any, once support for the old environment has been removed. The migration plan should also include • Requirements analysis and definition of migration, • Development of migration tools, • Conversion of product and data, • Migration execution, • Migration verification, and • Support for the old environment in the future.

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		NOTE 1 *The operational environment is made up of hardware, software or systems on which the product depends, including that which that the customer purchases and installs separately, from either the organization or other suppliers. Examples of changes from old to new software operational environments include upgrades to the operating system, database, or communications protocol stack. Examples of changes from old to new hardware operational environments include using existing circuit packs in new racks or with controllers, or upgrading computer hardware. Both hardware and software platform migration could affect either hardware or software components or systems so migration plans should cover all possibilities.* **NOTE 2** *If the old environment will no longer be supported, consideration should be given to arrangements for access to data that was used by, or associated with, the old operational environment, for data protection and audit purposes, in accordance with regulatory and contract requirements.* **Product migration plans will be developed and communicated to impacted parties when the specified operational environment is revised through product re-design.**
	7.3.1.HS.2.	Design and Development Process Quality Measurement Planning and Implementation
		During the design and development planning phase, the organization shall establish and maintain a method(s) for selecting and reporting appropriate design and development process quality measures for the project. As recommended during this phase, this measurement system shall be implemented appropriately to the project. The measures should cover the areas of project schedule (life cycle phase transition or milestone monitoring), test execution, and test phase defect monitoring. **NOTE** *See the document "Set Up and Operation of a Design Process Measurement System" referenced at http://tl900.org/links.html for guidelines to aid in selecting and establishing appropriate design and development process measurements for the project.*

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			Appropriate design and development process quality measures will be identified, tracked, and reviewed throughout the development project. Project appropriate measures will be determined during the project planning phase and reviewed during planned design reviews.
7.3.2. **7.3.2.1.**	**Design and Development Inputs** **Customer Input**	7.3.2.C.1.	Customer and Supplier Input
			The organization shall establish and maintain methods for soliciting and using customer and supplier input during the design and development of new or revised product requirements. **NOTE** *In conjunction with customer and supplier inputs, the organization should also consider results from competitive analyses.* **During the development of a new product, or during the extension of an existing product, customer input can be received in a variety of formal and informal methods, including:** • **Customer supplied documents and prints;** • **Industry standards and documents;** • **Field Sales Proposal Requests or Sales Logs;** • **Customer Visit Summaries.** **The Tyco Electronics engineering function is responsible for soliciting input from suppliers as required to ensure that the suppliers will meet the delivery schedules and the product will conform to established requirements.**
		7.3.2.C.2.	Design and Development Requirements
			Design and development requirements shall be defined and documented, and should include • Quality and reliability requirements, • Functions and capabilities of the product, • Business, organizational, and user requirements, • Safety, environmental, sustainability, and security requirements, • Manufacturability, installability, usability, interoperability, and maintainability requirements, • Design constraints, • Testing requirements, and • Computer resources for the target computer~~.~~, and • Lessons learned from previous projects. **NOTE** *Design and development requirements should be defined with a focus on preventing errors.*

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			Design and development requirements are defined, documented, and controlled through a design objectives or preliminary product specification document. Design input document(s) shall include all applicable product descriptions with known use requirements; quality, reliability, safety, and environmental requirements; and testing requirements.
		7.3.2.C.3.	Requirements Allocation
			The organization shall document the allocation of the product requirements to the product architecture. **NOTE** *Examples of requirements which should be allocated are response time for software, heat dissipation for hardware and service response time for services.* **Any applicable product requirements allocations to the product architecture shall be documented.**
		7.3.2.H.1.	Content of Requirements
			The product requirements shall include, but are not limited to • Normal values and tolerances, • Maintainability needs, and • End-term packaging requirements. **Defined product requirements shall include physical and performance values and ranges, maintainability criteria, and any applicable packaging requirements.**
7.3.3.	**Design and Development Outputs**	7.3.3.HS.1.	Design and Development Output
			Design and development outputs should include, but are not limited to • System architecture, • System detailed design, • Source code, and, • User documentation. **As required, product design and development inputs involving system architecture and design, source code, and/or user documentation shall be verified as design outputs.**
7.3.4.	**Design and Development Review**	7.3.5.C.1.	Verification of Documentation
7.3.5.	**Design and Development Verification**		The organization shall verify the customer and/or user documentation prior to product delivery. **Applicable user documentation such as Customer Manuals and Instruction Sheets shall be verified in accordance with planned arrangements prior to product release.**

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		7.3.5.HS.1.	Stress Testing
			The organization shall test the product under stress conditions, including, but not limited to, out-of-boundary and invalid input conditions, high volume and peak load simulations, and operational errors. **Product design and development verification shall include, as applicable, conditions beyond specified limits such as test to failure.**
		7.3.5.HS.2.	Abnormal Conditions
			The organization shall test the product under abnormal conditions, which shall include, as appropriate • Hardware errors, • Software errors, • Operations, administration, maintenance and provisioning (QAM&P) errors, • Overload traffic, • Invalid user input, and • System recovery from an outage. **Product design and development verification shall include, as applicable, specified conditions designated as abnormal.**
7.3.6. **7.3.7.**	**Design and Development Validation** **Control of Design and Development Changes**	7.3.7.C.1.	Change Management Process
			The organization shall establish and maintain a documented procedure(s) to ensure that all requirements and design changes, which may arise at any time during the product life cycle, are managed and tracked in a systematic and timely manner appropriate to the life cycle stage. The organization shall ensure that changes which adversely affect mutually agreed conditions for quality, reliability and functional intent are reviewed with the customer prior to approval. Management of changes should include • Impact analysis, including impact on resources and schedule, • Planning, • Implementation, • Testing, • Documentation, • Communication, and • Review and approval.

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		NOTE *While a change management process is required throughout the life cycle, controls within that process may depend on the life cycle stage. For example, during design, the organization should be able to react to rapidly changing customer requirements, and take advantage of emerging technologies with an encompassing, response change management process. After general availability, the change management process scope should consider how the change on the operation and maintenance of the product and its installed base impacts the community of customers and stakeholders. The consideration should include quality, reliability, and functional intent.* **All design changes (e.g., product, process, system, software, packaging style, packaging type, and material or component substitution) shall be identified, documented, reviewed, and approved by authorized personnel before implementation. Records of changes during the development process shall be maintained. Tyco Electronics defines the responsibilties for monitoring and ensuring that the changes do not adversely affect product quality, performance or reliability. (TEC-1000)**
	7.3.7.C.2	Informing Customers
		The organization shall establish and maintain a documented procedure(s) to ensure that customers are informed when design changes affect contractual commitments. **Tyco Electronics has established and maintained procedure(s) defining the requirements and responsibilities for contractually mandated customer and agency notification of product design changes affecting the product form, fit, function, packaging style, or packaging type. In addition and where contracted or mandated by quality system certification requirements, customer approval of design changes shall be obtained.**
	7.3.7.C.3.	Problem Resolution Configuration Management
		The organization shall ensure that its configuration management system tracks fixes to problems and incorporates those fixes in future revisions. **The established configuration management process involves the utilization of engineering change control and through control of the process documentation. When a corrective or preventive action directs a product or process change, that revision shall be tracked and verified as effective.**

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		7.3.7.H.1.	Component Changes
			The organization shall have a documented procedure(s) in place to ensure that material or component substitutions or changes do not adversely affect conformity to product requirements or performance. The documented procedure(s) should include • Functional testing, • Qualification testing, • Stress testing, • Approved parts listing, and/or • Critical parts listing. **Material or component substitutions or changes require the initiation of a deviation request subject to controls and authorizations including contracted customer approval. The documented controls include determination of customer specification violations, possible impact on manufacturing processes, effect on product acceptance criteria, and product tracking.**
7.4. **7.4.1.** **7.4.1.1.** **7.4.1.2.** **7.4.2.** **7.4.3.**	**Purchasing** **Purchasing Process** **New Suppliers** **Supplier Performance** **Purchasing Information** **Verification of Purchased Products**	7.4.1.C.1.	Purchasing Procedure(s)
			The organization shall establish and maintain a documented purchasing procedure(s) to ensure • Product requirements are clearly defined, • Risks are understood and managed, • Qualification criteria are established, • Acceptance criteria are established, • Contracts are defined, • Proprietary, usage, ownership, warranty , and licensing rights are satisfied, • Future support for the product is planned, • Ongoing supply-base management and monitoring is in place, and • Supplier selection criteria are defined. **NOTE** *The documented procedure(s) should be applicable to off-the-shelf product. This typically includes original equipment manufacturer (OEM) products used in manufacturing and commercial off-the-shelf (COTS) products used in software systems.* **Purchasing procedures include Quality Specifications TEC-1003, Supplier Performance Reporting and Continual Improvement Process, TEC-1005, Tyco Electronics Total Quality Management Requirements for Suppliers, and TEC-1006, Approval of Suppliers. Collectively these procedures**

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		• **Define the manner for evaluating, selecting, and re-evaluating suppliers,** • **Establish the expectations and performance criteria and** • **Describe the methods for managing and developing suppliers.**
	7.4.1.C.2	Supplier Performance Management
		The organization shall plan and perform supplier performance management and development activities so that • Suppliers are qualified to established criteria, • Evaluation results are considered during supplier selection activities, • Suppliers are periodically re-evaluated using established criteria, • Supplier quality performance is tracked and feedback is provided to suppliers to drive continual improvement, and • For identified key suppliers, alignment toward conformity to TL 9000 requirements and measurements or other appropriate quality management systems for the supplier's products occurs with a preference toward TL 9000. **NOTE 1** *Supplier performance management planning and activities should be in conjunction with the organization improvement processes of Section 8.5.* **NOTE 1** *It is recognized that it is not possible for an organization to provide the same level of interaction with all suppliers. The level provided may depend on the amount of business with a supplier, the criticality of products, history of problems, organization expectations, significance of a supplier within the supply chain or other factors.* **NOTE 3** *Examples of alignment toward conformity to appropriate quality management systems may include surveys, supplier questionnaires, supplier education and training regarding conformance to standards; the use of the TL 9000 requirements and measurements, in full or in part; second-party audits evaluating TL 9000 conformance or conformance to an appropriate quality management system; and TL 9000 or other quality standards certification. Examples include ISO 9001, AS 9100, CMMI, ISO/TS 16949, etc.*

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			Per the criteria in Quality Specification TEC-1006, Approval of Suppliers, suppliers are approved and identified in the Tyco Electronics Database (TED) and in the Purchasing Module of the various Tyco Electronics Enterprise Requirements Planning software such as SAP and the Purchasing On-Line Information System (POLIS). A supplier's approval scope provides a list of materials and products and limits what may be purchased from a particular supplier. **Per the definitions in Quality Specification TEC-1003, Supplier Performance Reporting and Continual Improvement Process, the primary source for supplier performance data will be information maintained in the Tyco Electronics Database (TED). This data will be used to monitor continual improvement of a supplier's performance and continual improvement of commodities managed by procurement. Periodic supplier performance reviews shall be conducted at a business unit, regional, and global level. At least one review shall be conducted annually for key suppliers. Performance reviews for nonstrategic suppliers will be conducted on an as-needed basis.** **Tyco Electronics designates key suppliers based on their willingness to work in a cooperative and collaborative manner in order to achieve mutual long-term competitive benefits. Development of key suppliers includes the integration of operations, systems, and people with Tyco Electronics' operations and process including quality management system compliance to applicable international and industry standards.**
7.5.	**Production and Service Processes**	7.5.1.C.1.	Service Resources
7.5.1.	**Control of Production and Service Processes**		The organization shall provide customer contact employees with appropriate tools, training, and resources necessary to provide effective and timely customer service. **As required, product installation and operation will be supported through manuals, instructions, training, and field service.**
7.5.2.	**Validation of Production and Service Processes**		
7.5.2.1.	**Process Monitoring and Operator Instructions**	7.5.1.C.2.	Product Delivery
7.5.2.2.	**Verification of Process Setups and Operational Changes**		The organization shall establish and maintain method(s) to minimize interference with the customer's normal site operation and service during product delivery and installation. **When appropriate, product delivery and installation shall be performed to minimize interference with the customer's operations.**
7.5.2.3.	**First Article Examination**		

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		7.5.1.HS.1.	Emergency Service
			The organization shall ensure that services and resources are available to support recovery from emergency failures of product in the field throughout its expected life. The organization shall identify potential situations that may have an impact on its ability to provide the emergency service and shall have response plans to address these situations. These plans shall be based on risk and periodically assessed. **Field support resources are available to ensure that needed support services are available in the event of an emergency product failure.**
		7.5.1.HS.2.	Installation Plan
			The organization shall establish and maintain a documented installation plan(s). The installation plan(s) shall identify the resources, the information required, the sequence of events and any necessary records. **Product installation resources are provided for application equipment requiring Tyco Electronics support upon delivery. Application equipment products are supported by installation instructions or customer manuals that may include equipment specifications, facility supply requirements, safety precautions, installation procedures, operating procedures, preventive maintenance, troubleshooting information, and spare parts lists.** **Tyco Electronics installed application equipment will include applicable records of installation, qualification, and customer acceptance.**
		7.5.1.HV.1.	Operational Changes
			Each time a significant change is made in the established operation (e.g., a new operator, new machine, or new technique), a critical examination shall be made to the first unit(s)/service(s) processed after the change. **Process setups shall involve a critical examination of the initial products manufactured during an initial production run, material change-overs, operator changes, or when significant time periods lapsed between production runs. Verification shall include a critical inspection of the initial product produced after the setup is completed. Job instructions shall be available for setup personnel.**
7.5.3. **7.5.3.1.**	**Product Identification and Traceability** **Inspection and Test Status**	7.5.3.H.1.	Traceability for Recall
			Field Replaceable Units (FRU) shall be traceable throughout the product life cycle in a way that helps organizations and their customers to identify products being recalled, needing to be replaced, or modified. **Products considered Field Replaceable Units (FRU) shall be serialized or individually identified to ensure their identity.**

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		7.5.3.H.2.	Traceability for Design Changes
			The organization shall define and implement methods necessary to provide traceability of design changes to identifiable manufacturing dates, lots, or serial numbers. **Manufacturing date codes and factory order numbers are utilized to maintain production lot / batch traceability.**
		7.5.3.HS.1.	Product Identification
			The organization shall establish and maintain a process for the identification of each product and the level of required control. For each product and its versions, the following shall be identified where they exist: • Product documentation, • Development or production tools essential to repeat product creation, • Interfaces to other products, and • Software and hardware environment. **NOTE** *Examples of product identification include barcode, tag, label, electronic ID, etc., containing information such as production lot numbers and dates, and serial numbers. New technologies for data retrieving such as RFID may also be considered.* **All product, in process and in inventory, shall be identifiable as to part number, and shall be traceable to revision level, and inspection status. Methods are utilized to provide traceability to specific production orders and the personnel, work centers, and materials used in the manufacture of a particular part.**
7.5.4.	**Control of Customer Supplied Product** **7.5.5. Product Preservation** **7.5.5.1. Shelf-Life**	7.5.5.C.1.	Protection from Electrostatic Discharge (ESD) Damage
			Where applicable, ESD protection shall be employed for components and products susceptible to ESD damage. **NOTE 1** *Types of components and products which should be protected include electronic parts, integrated circuits, printed wiring board assemblies, magnetic tapes and disks, and other media used for software or data storage.* **NOTE 2** *Certification to ANSI/ESD S20.20 published by the ESD Association should be accepted as indication that the certified facilities meet TL 9000 requirements 6.2.2.C.4 and 7.5.5.C.1 concerning ESD protection.*

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			Where applicable, anti–static protection shall be employed to provide protection against electrostatic discharge (ESD) damage. Packaging Engineering is responsible for establishing the requirements for product packaging. Manufacturing Engineering is responsible for establishment of ESD controls within the manufacturing operations.
		7.5.5.HS.1.	Packaging and Labeling Verification
			The organization shall establish and maintain methods to ensure that the packaging and labeling of products and components conform to specified requirements. **NOTE** *Packaging and labeling verification is normally performed on products ready to ship and may include marking and labeling (e.g., hazardous material marking, ESD sensitivity, barcoding), kitting, documentation, addressing, customer-specific marks, and verification of quantities to be shipped.* **The quality plan shall include assessments for adherence to the requirements for packaging and labeling, including, but not limited to, correct part number, count accuracy, and label formats.**
		7.5.5.HV.1.	Deterioration
			Where the possibility of deterioration exists, the organization shall establish and maintain methods to determine when materials that may impact product quality have deteriorated or exceeded their expiration dates, and assess any required subsequent action. **Materials that have a shelf life shall be clearly marked with an expiration date, or a date of manufacture that can be used to calculate an expiration date. Materials shall not be used past the expiration date without documented engineering approval. (TEC-1000)** **While most materials subject to physical deterioration resulting from age or environment are suitably identified with an expiration date, other product manufacturing materials subject to deterioration may not be identified. These materials should be evaluated, assigned, and identified with an application suitable shelf life.**
7.6.	**Control of Inspection, Measuring, and Testing Equipment**	7.6.C.1.	Equipment Identification
			Monitoring and measuring equipment that are either inactive or unsuitable for use shall be visibly identified and not used. All monitoring and measuring equipment that do not require calibration shall be identified.

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	The control of inspection, measuring, and test equipment shall include the visible identification of equipment that is either inactive or unsuitable for use and shall not be used. In addition, measuring equipment used for "indicating purposes only", or that for any reason is not to be calibrated shall be identified and marked or labeled using any suitable means.

8. MEASUREMENT, ANALYSIS AND IMPROVEMENT

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8.1.	**Measurement, Analysis, and Improvement – General**	8.2.1.C.1.	Customer Satisfaction Data
8.1.1.	**Statistical Techniques**		The organization shall establish and maintain a method to collect data directly from customers concerning their satisfaction with provided products. The organization shall also collect customer data on how well the organization meets commitments and its responsiveness to customer feedback and needs. This data shall be analyzed and trended. **There shall be a documented process for determining customer satisfaction, including frequency of determination, and how objectivity and validity are assured. Trends in customer satisfaction and key indicators of customer dissatisfaction shall be documented and supported by objective information. As appropriate, these trends should be compared to those of competitors, or benchmarks, and reviewed by senior management. Customer satisfaction data are received in a variety of methods, including:** • **Feedback received in response to answers to customer complaints;** • **Dialogue between the customer and Field Sales or Product Management which is then documented in a Field Report or trip visit summary;** • **Industry positioning surveys;** • **Lost business reports;** • **Supplier "report cards";** • **Meetings with customers;** • **Ship to customer request performance.** **Customer satisfaction / dissatisfaction will be included as a topic within the senior level management review. If applicable, actions taken will be monitored within the management review process.** **Customer recognition and awards are posted on the Tyco Electronics website. In addition, numerous other reporting methods exist, including Global Delivery Scorecard, backlog status, Customer Service metrics and local QOS reviews.**
8.2.	**Monitoring and Measurement**		
8.2.1.	**Customer Satisfaction**		
8.2.2.	**Internal Assessment and Audits**	8.2.3.C.1.	Process Measurement
8.2.2.1.	**Manufacturing Process Audits**		Process measurements shall be identified, documented, and monitored at appropriate points to ensure continued suitability and promote increased effectiveness of processes. This includes the establishment of appropriate design process measurements. Key process measurements that impact conformity to product requirements should have specific performance targets or control limits established.
8.2.2.2.	**External Assessments**		
8.2.3.	**Process Monitoring and**		

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	Measurement		**The production process documentation and / or the quality inspection plan shall include measurements and control points to ensure the continued suitability and effectiveness of the processes to produce conforming product. (TEC-1000)**
8.2.4. **8.2.4.1.** **8.2.4.2.**	**Monitoring and Measurement of Product** **In-Process Inspection** **Final Inspection**	8.2.4.H.1.	Periodic Retesting
			The organization shall establish and maintain a documented procedure(s) that ensures products are periodically retested to access the product's ability to continue to meet design requirements. When determining the depth of the retest, the organization should consider the conditions in 8.2.4.H.3. **Tyco Electronics has established and maintained procedure(s) defining verification/engineering testing, validation/qualification testing, and the periodic retesting to assess the product's ability, and ensure the product's continued ability, to meet design requirements.** **Product retesting is conducted when:** • **Required by customer contracts or applicable government, industry or agency standards.** • **In the opinion of the Engineering function changes to the design or manufacturing process have occurred that could significantly affect the form, fit or function of the product.** • **Field performance reports indicate a consistent trend that the product may no longer be capable of meeting the performance requirements.** • **Based on product complexity and application criticality, the default interval established by Engineering.**
		8.2.4.H.2.	Content of Testing
			The initial test and periodic retest shall be more extensive than the routine quality tests. The initial test shall include those that are contained in the customer's and/or organization's product specifications and/or contracts. The results of these shall be documented. **NOTE** *Product specifications may include environmental vibration, flammability, operational stress type testing, and intrusion/penetration testing.* **While routine product inspections consist of verifying designated product characteristics, initial and periodic product qualification testing includes product validation to additional specified requirements that may include environmental and life testing.** **Product / Development Engineering, in concert with the test laboratory, will define the content of the initial and periodic product retesting.**

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	8.2.4.H.3.	Frequency of Testing
		The organization shall establish and document the frequency for test and periodic retest. When determining the test frequency, the organization shall include • Product complexity and service criticality, • Number of design, engineering and/or manufacturing changes made to the product and whether the change(s) affect form, fit, or function, • Changes to the manufacturing process, • Manufacturing variations, (e.g., tooling wear), • Material and/or component substitutes and failure rates, and • The field performance record of the product. **Product retesting ensures the product's ability to continue to meet design requirements. The extent and timing of product retesting shall be determined by the design engineer after consideration of multiple factors. Product retesting is required on a periodic basis and after specific time intervals. Even if not required by government, industry or agency standards, periodic retesting is still warranted by the complexity of the product or by its use in hazardous or critical application(s). Product retesting will occur for all products on an irregular schedule, based upon the number and type of design or manufacturing changes made since the last product qualification. These changes include release of product extensions, raw material changes or substitutions, use of new suppliers and past field performance. Product retesting shall be completed when:** • **Required by customer contracts or applicable government, industry or agency standards.** • **In the opinion of the Engineering function changes to the design or manufacturing process have occurred that could significantly affect the form, fit or function of the product.** • **Field performance reports indicate a consistent trend that the product may no longer be capable of meeting the performance requirements.** • **Based on product complexity and application criticality, the default interval established by Engineering.**
	8.2.4.H.4.	Testing of Repair and Return Products
		Repair and return products shall be subjected to the appropriate evaluation(s) and/or test(s) to ensure functionality to product specification. **Products returned as customer returned material and determined to be defective will be evaluated to determine the root cause and establish necessary corrective actions. Products returned for repair will be subjected to the same inspection and test criteria as newly manufactured product.**

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	8.2.4.HV.1.	Inspection and Test Documentation
		Each inspection or testing activity throughout the product life cycle shall have detailed documentation. Details should include, but are not limited to • Parameters to be checked with acceptable tolerances, • The use of statistical techniques, control charts, etc., • Sampling plan, including frequency, sample size, and acceptance criteria, • Handling of nonconformities, • Data to be recorded, • Defect classification scheme, • Method for designating an inspection item or lot, and • Electrical, functional, and feature testing. **In-process and final product inspection plans specify the following:** **Product characteristics to be verified with acceptance limits,** • **The application of process control statistical techniques such as control charts,** • **Sampling strategies including sample sizes and skip lot criteria, and** • **The data to be recorded including inspector identification, production order traceability information, actual sample sizes, applicable variables data, applicable environmental conditions, and measurement devices used.**
	8.2.4.HV.2.	Inspection and Test Records
		Inspection and test records shall include • Product identification, • Quantity of product, • Documented procedure(s) followed, • Person(s) performing the test or inspection, • Calibrated equipment used, • Date performed, and • Number, type, and severity of defects found. **Product inspection and test records include:** • **A product description including part number and revision status,** • **Information relative to the production order including dates and quantities,** • **The product quantity inspected or tested and any procedures defining the inspection or testing,** • **The person(s) performing the inspection and testing,** • **The specific measurement devices used to perform the inspection and testing, and** • **The inspection and test results.**

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8.3.	**Control of Nonconforming Product and Materials**	8.4.C.1.	Trend Analysis of Nonconforming Product
8.4.	**Measurement and Analysis of Organizational Performance**		Trend analysis of discrepancies found in nonconforming product shall be performed on a defined, regular basis and results utilized as input for corrective and preventive action. **The Quality Assurance Director / Manager and each Business Unit Director shall have the responsibility to maintain performance data including the required TL 9000 metrics and trends in nonconforming product. Data shall be translated into actionable information to support the Quality Policy, business plans, and customer satisfaction.** **Trends in quality and operational performance shall be compared with progress toward objectives. All functions shall utilize facts, data, and quality records for improvement planning, for minimizing repetitive nonconformance situations, and for determining corrective / preventive action strategies.**
		8.4.HS.1.	Field Performance Data
			The quality management system shall include the collection and analysis of field performance data which can be used to help identify the cause and frequency of product failure. In addition, no trouble found (NTF) data shall also be maintained. This information shall be provided to the appropriate organizations to foster continual improvement. **Customer satisfaction / dissatisfaction is evaluated through several tools that may include: customer complaints, customer feedback responses, the Quality Operating System (QOS) process, reports and information from Field Sales and Product Management and from Industry Reports.**
8.5. **8.5.1.**	**Improvement** **Continual Improvement**	8.5.1.C.1.	Continual Improvement Program(s)
8.5.2. **8.5.3.**	**Corrective Action** **Preventive Action**		The organization shall establish and maintain a continual improvement program(s) that includes a focus to improve • Customer satisfaction, • Quality and reliability of the product, and • Other processes/products/services used within the organization. **NOTE** *Inputs to the continual improvement program may include lessons learned from past experience, lessons learned from previous projects, analysis of measurements, cost of poor quality, post-project reviews, emerging technologies supporting sustainability, and comparisons with industry best practices.*

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		The spirit of the Tyco Electronics quality improvement program is to cost effectively achieve the basic tenets of the Tyco Electronics Quality Policy: delivery of high quality products and services, on time. Improvement initiatives should be directed at reaching this state of "zero defects". This quality improvement program consists of many activities including: • **The on–going review of this Quality Manual and the supporting documents;** • **Actions resulting from assessments and audits, management review, corrective action, preventive action and the Quality Operating System (QOS) process;** • **Analysis of customer provided information, such as satisfaction data, supplier performance reports, and data relative to the quality and reliability of our products;** • **Analysis of measurements and actions directed at improving customer satisfaction, process performance, and product quality, such as improving delivery, improving response time to customer communications, decreasing scrap, improving manufacturing utilization, decreasing inventory, and reducing design and manufacturing lead times.**
	8.5.1.C.2.	Employee Participation
		The organization shall implement methods for encouraging employee participation in the continual improvement program(s). **As stated in the Tyco Electronics Quality Policy, continual improvement is the personal responsibility of every employee. Formal methods for encouraging employee involvement may include: employee recognition systems, employee suggestion systems, department / shift / team meetings, bonus programs, and participation on problem solving or improvement teams.**

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Bill Arbogast
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January 26, 2010

Dear Mr. Arbogast:

A special assessment document review was undertaken by LRQA to examine Tyco Electronics Corporation's Global Quality Management System Process (quality manual) TEC-1023(B). LRQA has determined that TEC-1023(B) conforms to the quality manual requirements of TL 9000 Handbook, Release 5.0.

This statement of conformance is limited, applying only to Tyco Electronics Corporation's top level quality management document and as such does not meet the requirements for a full Stage 1 assessment as described in ISO/IEC 17021 or LRQA assessment procedures.

Sincerely,

Ashley Davis

Ashley Davis
Senior Client Service Coordinator