ISO 9000 Quality Standards and Commissioning Overview

PART 1: ISO 9000*

***This material was prepared by Professor Jeff Lew (retired), Purdue University

ISO 9000 and ANSI/ASQ Q90 series quality standards guide quality on a worldwide basis. Knowledge of these standards and their certification procedures is essential to contractors and design professionals in order to remain competitive in a global market-driven economy. Customers and suppliers have grown to expect quality efforts to comply with these standards. Failure to do so may eventually cause a company to lose its competitive edge.

ISO 9000 and American Society for Quality (ASQ) Q90 standards are made up of five categories. A company seeks certification under the one that is appropriate to its position. The impact of ISO 9000 and ANSI/ASQ Q90 standards is well understood by companies who are competing in the product markets of the world. The significance of ISO 9000 and ANSI/ASQ Q90 standards on the economics and competitiveness of service industries such as construction is less well understood.

INTRODUCTION

ISO is the International Organization for Standardization, which is located in Geneva, Switzerland. ISO develops and promotes common standards on a worldwide basis. ISO 9000 is the generic name for the series of quality standards adopted in 1987 by the former European Economic Community, now known as the European Union. ISO 9000 as a quality standard is a key element of the international standards for quality management and QA.   A company seeks certification under one of the five categories depending on their individual circumstances.

The series is not a set of product standards, nor is it specific to any one industry. QA and quality Management system standards are complementary to the standards of a product, which affect the functionality of the product or service. QA and quality management standards refer to quality system elements that are to be implemented, not the means for implementing them. The series is generic and when used with the appropriate industry-specific QA guidelines, builds a strong foundation for a quality system.

The ISO has over 90 member countries, with the American National Standards Institute (ANSI) representing the United States. U.S. participation in ISO is carried out by ANSI-sponsored Technical Advisory Groups. The ISO 9000 series of quality standards was adopted, word for word, by ANSI as the ANSI/ASQ Q90 series.

The five ISO 9000 and ANSI/ASQ Q90 categories are briefly described as follows:

1. ISO 9000 and ANSI/ASQ Q90 is the first in the series of five. It defines the five key quality terms in the standard, and is advisory in nature in that it provides guidelines and is the road map for selecting and using the other standards in the series.

2. ISO 9001 and ANSI/ASQ Q91 consists of 20 sections applying to firms involved in both the design and the manufacture or production of products or services. It specifies a model for use when a contract between two parties requires the demonstration of a supplier's capability to design, produce, install, and service a product. This category carries the most stringent requirements.

3. ISO 9002 and ANSI/ASQ Q92 consists of 18 sections that apply to firms involved only in manufacturing, and is more oriented to QA for production and installation than ISO 9001. Requirements for this category are not as stringent as for ISO 9001.

4. ISO 9003 and ANSI/ASQ Q93 cover companies that are involved in distribution of manufactured products or services only. It serves as a model for QA in final inspection and testing. Requirements for ISO 9003 certification are the least stringent of the series.

5.   ISO 9004 and ANSI/ASQC Q94 is again advisory in nature, and offers quality management and

quality system guidelines on the elements of quality management systems and quality systems to

determine the extent to which each is applicable.

These series of standards are not rigid and inflexible. The ISO 9000 series is flexible and is periodically

reviewed to take into account methodologies that prevent defects, such as statistical process control for

projects and the employment of self-managing work teams.

The ISO 9000 and ANSI/ASQ Q90 standards need to be understood as the minimum required standard for an

acceptable quality system. This must not be taken as the final mark of excellence. Many sets of quality

standards and awards are currently being used. A relative ranking for the more common quality system

benchmarks is shown in Figure 1. The ISO 9000 and ANSI/ASQ Q90 standards should be used as a

minimum standard upon which to build a quality system on a strong foundation. The system can then be

further developed to achieve a desired level of excellence.

FIGURE 1: QUALITY SYSTEM BENCHMARKING
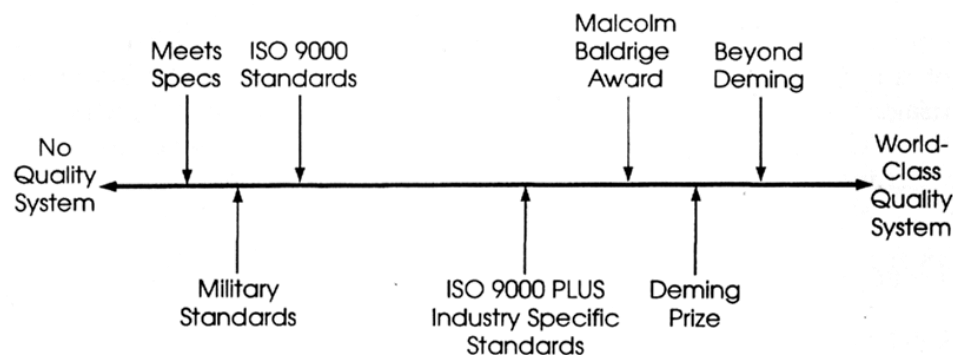
BACKGROUND AND DEVELOPMENT OF ISO 9000

ISO 9000 quality system standards describe a comprehensive, but basic set of QA standards that have many elements common with U.S. Department of Defense (DOD) quality specifications used for the military. These DOD standards were adopted by the North Atlantic Treaty Organization (NATO), then broadened and strengthened by the British. Finally, the evolutionary process of these quality standards was completed with their adoption by ISO in 1987 to facilitate free trade within the European Community. In 1993, DOD replaced its MIL specifications with ISO 9000.

The American National Standards Institute (ANSI) with the American Society for Quality (ASQ), rather than independently revising and extending its existing quality systems standards, elected to join with other nations in adopting standards fully consistent with ISO 9000. Standards adopted as ANSI/ASQ Q90 through Q94 were written to be technically equivalent to the ISO 9000 through 9004 series. The benefit of this procedure was to incorporate customary American language usage and spelling into the standard. Thus, for all practical purposes, the ISO 9000 series and the ANSI/ASQ Q90 series have the same meaning.
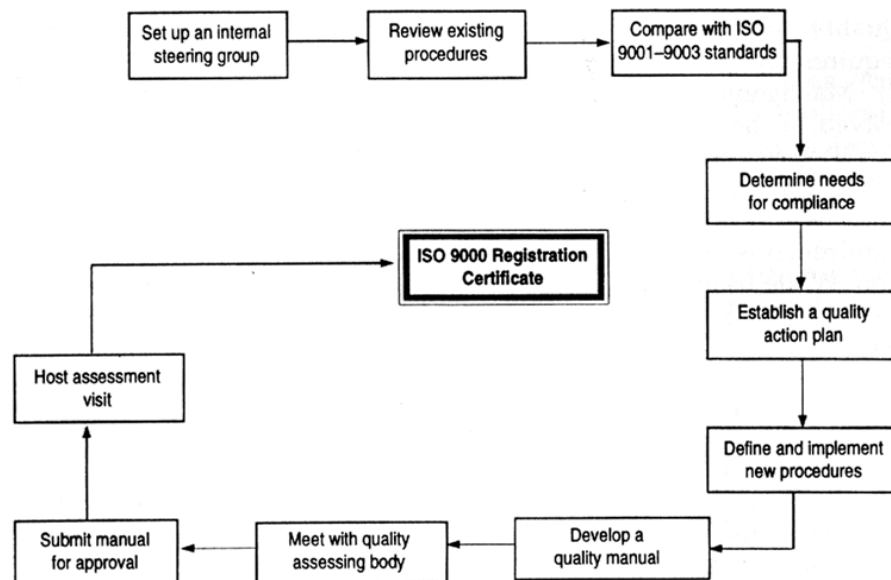
DESCRIPTION OF ISO 9000 CERTIFICATION

Certification of a company under one of three categories of 9001, 9002, or 9003 is granted by a certifying organization described in the next paragraph. Certification to ISO 9000 confirms that a company's practices and procedures are consistent with ISO 9000 standards. In other words, a firm is certified that they actually do what they say they do. Certification is required for each facility (location or office) within a particular company. The certifying procedure is carried out in three steps.

1. The certifying organization compares the applicant's quality manual with the 9000 standard and verifies that procedures and systems are consistent with the manual.

2. The auditors of the certifying organization conduct an initial audit of the applicant's facility to verify that practices and systems comply with the procedures in the manual. Suppliers, vendors, and customers are contacted to confirm consistency with the manual.

3. The certifying organization issues certification after successful completion of the above steps. Certification desired under ISO 9000 and ANSI/ASQ Q90 can be obtained by asking the certifying organization to include both on the certification paperwork.

The process required to achieve certification of a quality system is shown in Figure 2.

FIGURE 2: STEPS FOR ISO CERTIFICATION

CERTIFYING ORGANIZATIONS

Nearly 40 organizations (many European) are presently authorized by agencies like the National Accreditation Council for Certification Bodies of the United Kingdom (U.K.) to offer ISO 9000 certification. In addition, ANSI/ASQ and other organizations are establishing processes for direct domestic certifying organizations and accreditation of registrars.

CERTIFICATION REQUIREMENTS

The principal, unifying requirement for certification is documentation. The critical documentation item is the firm's quality manual. The manual must be developed in a prescribed format with the appropriate language and include documentation systems. In summary, a firm must be able to document, plan, implement, and evaluate an ISO 9000 Quality System.

The manual serves as a tool to incorporate the ISO 9000 Series of Quality Standards into an organization. By covering the various sections of the ISO 9000 standard in a clear and concise fashion, documentation of how a firm meets the standard is provided.

It should be stated that it is not difficult to obtain and retain ISO 9000 certification. ISO 9000 is considered less stringent than many quality requirements presently in effect. ISO 9000 is considerably less demanding than the requirements of the Malcolm Baldrige National Quality Award. However, it is possible and likely that certification requirements will become increasingly more difficult with time.

Management should note that all employees of a facility are involved in the ISO 9000 implementation process. This is true for any quality process. The certifying auditors can talk randomly with personnel throughout an applicant's organization, including outside suppliers and customers. Therefore, all employees must understand the requirements of the ISO process in order to obtain successful certification. While training is not required for ISO certification, it is certainly needed in a practical sense, and should be up and running before final certification.

QUALITY SYSTEM ELEMENTS

One should understand that ISO 9000 is intended to pertain to all businesses, including the service (or construction) industry, as well as manufacturing. The system is, of course, generic and as such is philosophical, but not necessarily specific, in nature.

The quality system elements required under ISO 9000 and ANSI/ASQ Q90 standards are listed as follows:

Contract Review

Control of Nonconforming Product*

Corrective Action

Design Control and Servicing**

Document Control*

Handling, Storage, Packaging, and Delivery*

Inspection and Testing*

Inspection and Test Status*

Inspection, Measuring, and Test Equipment*

Internal Quality Audits

Management Responsibility

Process Control

Product Identification and Traceability*

Purchaser Supplied Product

Purchasing

Quality Records*

Quality System*

Statistical Techniques

Training

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*ISO 9001 only.

**ISO 9003 includes only these elements.

TIME AND COST

It is difficult to assess the time that it takes to obtain certification. This is due to the fact that the time required depends on the applicant's quality system status at the time the registration process begins. Again, the key point here is documentation. If a firm's documentation coincides with the model that auditors expect to see, the certification process can take as little as six months. Firms starting from scratch without any formal quality systems can take 18 months to 3 years to obtain certification. The cost of certification can be $5,000-$10,000, along with 1000-1500 hours for audit preparation. The actual audit takes 2-4 days to conduct.

APPLICATION TO DESIGN AND CONSTRUCTION

Design and construction firms and contractors are concerned with the institutionalization of quality systems. The procedure for applying for certification is given in the following paragraphs as a typical example of how to go about obtaining certification.

1. A firm must first understand what ISO 9000 and ANSI/ASQ Q90 standards are, along with the definition of the key elements of TQM.

2. An applicant must understand the ISO 9000 and ANSI/ASQ Q90 series standards as described previously in the introduction to this article.

3. The applicant determines which of the ISO 9000 and ANSI/ASQ Q90 standards apply best to their firm. Most design and construction firms and contractors should seek certification under ISO 9001. A case can be made for 9003, but these firms would have to demonstrate that their final inspection would catch all errors and that proper corrective measures could be provided.

4. The registration and certification of a firm's facilities is normally made one location at a time, for example, one certification for each design office or contractor's office. Registration can also be made for a single system at a particular location. The quality system must provide an end product (or service) to an external customer, such as a set of plans for a wastewater treatment plant. In summary, registration and certification of an entire firm requires that each office or each construction division go through the application process and be audited.

5. The preparation of the manual described earlier must contain a description of everything that a company does, and be prepared to show an exact duplication of what is being done. There are two types of manuals required for the audit:

   a. The policy manual, or who does what, includes policy statements, describes responsibilities, and denotes the authority of personnel. Also included is the written commitment of company management to include their involvement and leadership.

   b. The systems manual, or how things are done, includes detailed descriptions of all systems in a company. This means comprehensive and detailed flowcharts of the work flow process with responsibilities shown for work and quality. However, note that only issues relating to assuring quality need to be addressed in this manual. Companies that perform engineering and engineering design need to include these functions in quality documentation systems.

CONCLUSION

Although ISO 9000 and ANSI/ASQ Q90 series certifications are not required domestically in design and construction, they are a necessity for overseas operations. Overseas companies are becoming involved in certification and domestic companies also need to become involved. Design and construction firms need to understand the certification requirements, since they are used by many owners, suppliers, and vendors (in other words, the customers of the construction industry).

PART 2: COMMISSIONING

Commissioning is a concept that has evolved from several sources. First, clients/owners have reduced their own design, construction, facilities, and maintenance staffs necessitating greater outsourcing. Second, building systems have become more complex requiring increased expertise to maintain cost-effective operations. Third, clients have become more demanding of their outside design and construction consultants and contractors, and are expecting increased services.

The American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) prepared a guideline (1-1996) that defines the concept of Commissioning. "Commissioning is the process of ensuring that systems are designed, installed, functionally tested, and capable of being operated and maintained to perform in conformity with the design intent. In this guideline, Commissioning begins with planning and includes design, construction, start-up, acceptance and training and can be applied throughout the life of the building." In essence, it ranges from conception to demolition.

Many design firms, particularly architects, view Commissioning as simply another threat to their traditional area of control and responsibility. The truth is, however, that many design firms do not provide this service to their clients. Clearly, the need exists and if design firms fail to market this service to clients, then other specialists will. Consultants have already appeared who are called the *Commissioning Authority* or *Commissioning Agents*. Commissioning services are typically marketed as an additional service at an extra fee. Project managers need to be aware of the opportunities Commissioning provides to both design firms and owners.