

## THE OPPORTUNITY OF APPLYING MODELS OF QUALITY MANAGEMENT SYSTEM IN PUBLIC CONSTRUCTION ENTERPRISES

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In this article was analyzed the history of standard ISO-9000 and ways of application in public construction enterprises.

**Keywords:** *Quality, Management, History of Standard ISO-9000, Contents of ISO-9000, Distribution of ISO-9000, TQM method, Guideline Publication, Quality Policy, ISO-9000 AQAP.*

### OPORTUNITATEA APLICĂRII MODELELOR DE SISTEM AL MANAGEMENTULUI CALITĂȚII ÎN ÎNTERPRINDERILE DE CONSTRUCȚII PUBLICE

În articol sunt analizate istoria standardului ISO-9000 și modalitățile de aplicare a lui în întreprinderile de construcții publice.

**Cuvinte-cheie:** *calitate, management, istoria Standardului ISO-9000, conținutul ISO-9000, distribuția ISO-9000, metoda TQM, guideline-ul publicării, politica calității, ISO-9000 AQAP.*

**The History of Standard ISO-9000:** The starting point of ISO-9000, as the starting point of the theory of quality from the school of Juran and Deming, was in the period following World War II - this time, on the other side of the globe. After World War II, NATO was founded. In order to set equal standards for the products arriving from suppliers from NATO countries, a document was made in 1969 detailing the quality requirements. The document is called AQAP. This document was based on a similar document of the U.S. Department of Defense - MIL-Q-9858A (Arnold, 1994).

Transition to the civilian market followed the formulation of a similar document in the UK called Def Stan 05 in 1973, followed, in 1979, by Standard BS-5750 of the British Standards Institute. This standard, unlike its predecessors which focused on a final examination of the product by inspectors, was designed according to the new wind blowing from the east and gave voice to the principles of modern quality management.

For a long time, standard BS-5750, especially in Europe, was the most accepted quality standard. However, standard BS-5750 was not recognized in all countries, and different countries had their own quality standards, which caused complication and confusion for international companies. In 1987, the ISO – International Standardization Organization – published a series of standards under the name ISO-9000. These standards, which are based on the British Standard BS-5750, constituted the proper international response for the global need of an equable quality standard, at a time when the world had become, more and more, a global village.

In the nineties, standard ISO-9000 began to take, quite rightly, the place of the TQM as the leading concept in the world of quality. Unlike TQM, which was written in countless books and from different and varied perspectives, Standard ISO-9000 defines, in one anchored and crisp-clear document, the demands from an organization wanting to establish a quality system. Furthermore, the qualification process for ISO-9000 is accompanied by a tester who certifies the organization – something that results in motivation for progress and meeting goals. Additionally, the certification for the standard is a certificate, and a proof to whoever requires it, that the organization manages a quality system.

Another reason for the wide circulation of standard ISO-9000 is the ripple effect it created. More and more governmental, institutional and private bodies began asking for the stamp of approval of ISO-9000 from their suppliers, who later began asking for the stamp of approval from suppliers and so on.

Despite the above, ISO-9000 is not TQM, because it does not contain all of its components, but a skeleton on which to build the TQM method. Standard ISO-9000, in itself, constitutes a framework for a quality assurance system, and the evidence for this is its very definition.

The definition of the Israeli Standard 9001, from the introductory chapter of IS 9001-9003 (the Israeli equivalent of quality standards ISO 9000-9003): "Quality System – model for quality assurance in production, installation, etc."

The question is: without understanding the underlying philosophy behind quality management (for example: Deming's 14 points), without establishing teamwork and without statistical control methods, is there a possibility, in the long run, to implement ISO-9000 effectively and beneficially?

**The Establishment of the ISO Organization:** Establishment of the ISO organization was done by combining the International Federation of the National Standardizing Associations (ISA), which was established in 1926, and the United Nations Standards Coordinating Committee (UNSCC), which was established in 1944.

In October, 1946, 65 delegates from 25 countries convened at the London Institute of Civil Engineers, and in this meeting, an International organization was established whose purpose was to "facilitate global adjustment and consolidation of the indices dependent on industry". This organization started out on February 23<sup>rd</sup> of 1947, and on April of the same year, a meeting was held in Paris where 67 technical committees were established. In the fifties, these committees began spreading the recommendations of national indices.

In the mid-sixties, as a result of the multitude of commercial transport operations between the countries, a need arose for the consolidation of indices between the countries to be agreed on. In 1971, a decision was published stating that the guidelines of the committees are not only recommendations but became binding guidelines between the countries. As a result of this and of the guidelines of the committees, the ISO organization became what we know today, the largest organization that handles the publishing of international guidelines and indices.

**The Structure of Standard ISO-9000:** Standard ISO-9000 is actually a series of standards and not one standard. Standards ISO-9001, ISO-9002 and ISO-9003 apply to businesses according to the scope of their activities. ISO-9004 and standard series ISO-9000-X are standards that include special guidelines for special industrial implementations, as shown in Figure 1 (Burg, 1995).

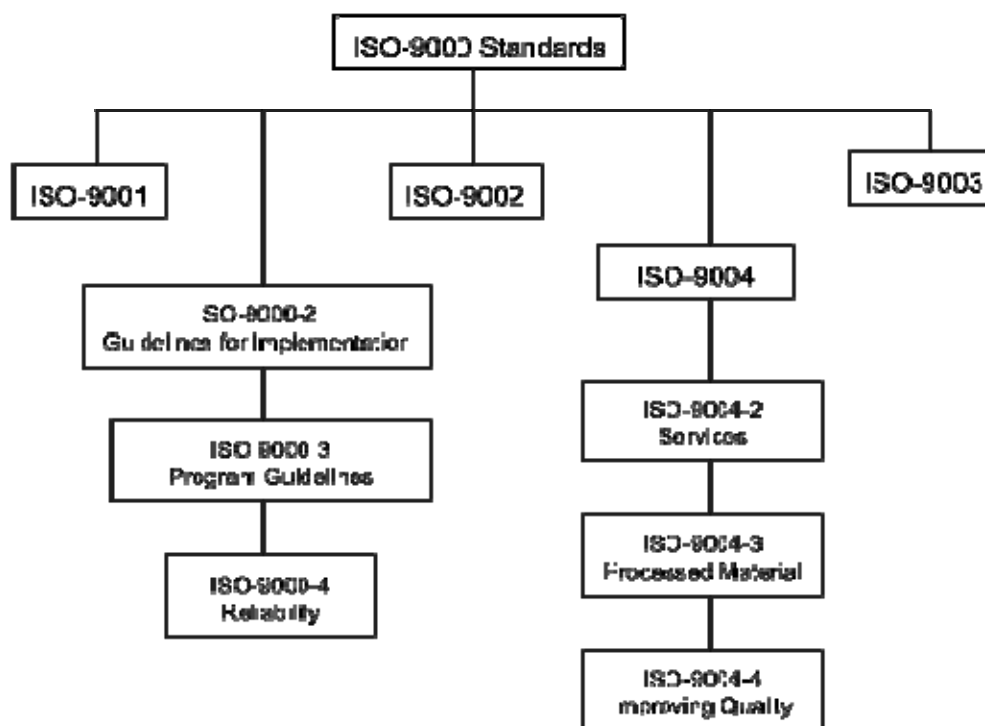


Fig.1. ISO-9000 Standards.

**Contents of ISO-9000 Standards:** ISO-9000 standards focus on twenty aspects, elements, of a quality plan, that will be subjected to rigorous audits in the certification process. Each element is in a chapter, while ISO-9000 includes all the chapters, and in ISO-9001 and till ISO-9003, certain clauses are placed according to the designation of the standard, as shown in Figure 2 (Rabet and Burg, 1995).

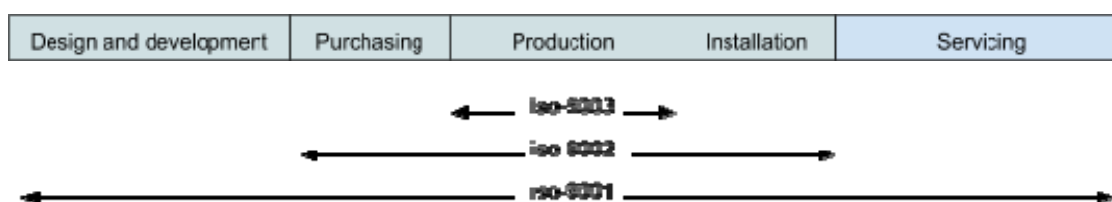


Fig.2. The Scope of ISO-9000 standards.

Table

## Requirements of ISO-9001-9003 standards

			Missing in ISO-9002	Missing in ISO-9004
Management	4.1	Management Responsibility		
Management	4.2	Quality System		
The company	4.5	Document and Data Control		
The company	4.8	Product Identification and Tractability		
The company	4.12	Inspection, Measuring and Testing Status		
The company	4.13	Control of Nonconforming Products		
The company	4.14	Corrective and Preventive Action		X
The company	4.16	Control of Quality Records		
The company	4.17	Internal Quality Audits		X
The company	4.18	Training		
Requirements	4.3	Order Entry		X
Requirements	4.4	Design Control	X	X
Requirements	4.6	Purchasing		X
Requirements	4.7	Control of Customer Supplied Products		X
Requirements	4.9	Process Control		X
Requirements	4.10	Inspection and Testing		
Requirements	4.11	Inspection and Testing Equipment		
Requirements	4.15	Handling, Storage, Packaging, and Delivery		
Requirements	4.19	Servicing	X	X
Requirements	4.20	Statistical Techniques		

- Management: Management activities
- Company: Overall company activities
- Requirements: Special requirements for specific parts of the company

The different chapters are formulated in a manner appropriate for implementation in different types in an organization. You can classify the chapters in standard ISO-9000 into chapters that require management

activities, such as purchasing department, operation department or performance division. You can see the classification of chapters according to this key and their non-validity in the standards ISO-9002 and ISO-9003 in Table 1 (Arnold, 1993).

**Procedure Ranking in ISO-9000 System:** There are actually 3 layers in a quality system based on ISO-9000, as described in Figure 2: (a) general procedures, also called quality procedures, (b) work instructions, also known as work orders, work procedures, performance orders, or internal procedures, (c) forms and reports (SII, 1994).

General procedures are based on the chapters listed above in Table, and their role is to determine the general framework of the quality system, as well as to operate the quality system. An example of defining the framework of a quality system by the general procedures is: determining the duty-holders in the quality system and the responsibility of each duty-holder. Operating the quality system by general procedures is done in two ways: directly and by activating the next layer of procedures, or directly by defining how to perform corrective action, for example. Activating the next layer of procedures can make the definition of how to execute the control in the process and referral to appropriate work instructions.

Work instructions explain how to perform different operations related to the quality system. For example: how to handle supplier invoices or how to check sequence performance. Some of the work instructions require forms or reports that are actually checklists also referred to as testing forms. For example, it is likely to assume that the procedure for testing the manner of performance of a sequence would be accompanied with a checklist of things to test.

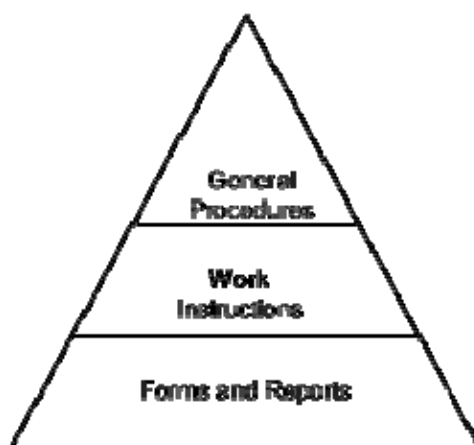


Fig.3. Hierarchy of ISO-9000 procedures.

**Distribution of ISO-9000:** ISO-9000 has revolutionized the business world. It is still too early to conclusively determine whether the results of the revolution are only a cosmetic change or a real and substantial change in business perception, whether there is a continuous improvement in companies that have implemented ISO-9000, whether the standard creates non-quality cost savings, and whether ultimately the target of quality has been achieved: "satisfying customer requirements".

It can be determined that ISO-9000 caused the most significant exposure to the subject of quality in a world-scale. Before ISO-9000 was created, exposure to quality management and quality assurance was relatively limited, and the subject was common mostly in continental Europe, Japan and the United States, and limited mostly to action.

After the ISO-9000 was created, distribution of quality management and quality assurance grew exponentially and worldwide. The number of companies that are now accredited to ISO-9000, in Israel alone, is 2600. Branches, in which the attitude that there is no need for quality system was traditionally accepted, implemented and received certification for ISO-9000. The examples are many: hotels and restaurants, financial and other advisors, public institutions, the IDF, education and health institutions and more (SII website, 1998).

A good example of the penetration of quality assurance to branches that are not concerned with industrial production is the penetration of ISO-9000 to construction branch in Israel. Nowadays, approximately 200 companies in the construction branch in Israel have certification for ISO-9000, and many are in the process of certification.

**Guideline Publication:** The International Organization for Quality of ISO has published, since its inception in 1947 to date, 1700 guidelines in the following areas: mechanical engineering, basic chemical engineering, non-rigid materials, system management, photography, agriculture, construction, special technology, health, medicine, environment, packaging and distribution.

In its publication, two series of guidelines were published, and they are: ISO-9000 and ISO-14000. The first is associated with quality procedures and the second with the environment. Nowadays, more than 51 countries have adopted the quality systems as national guidelines, including the European Union and U.S.

It is important to distinguish between the manufacturer's guidelines, which are pedantic about product features, and the features which were determined by quality procedures that assure the suitability of the product to the quality level set by the company. The manufacturing company can determine the quality level of its product based on market research and customer requirements. On the other hand, quality procedures help with correct planning of production and with the assurance of receiving the product in the same quality level that was set.

ISO series began in professional committee number 8402 in 1986, which goal was to consolidate and define individual concepts in quality procedures, and later issued a series of guidelines:

ISO 9001: 1987 quality assurance in systems of design, development, production and servicing.

ISO 9002: 1987 quality assurance in systems of production, installation, and servicing.

ISO 9003: 1987 quality assurance in systems in final inspection.

Each system was adapted to its operations. After that, the ISO 9004 system was issued, which was a manual and guidelines for quality procedures, and developed over the years to become the world's most popular guide.

In 1994, the professional committee issued a new family of 9000 quality set which has an emphasis on quality assurance and preventive actions instead of the final inspection.

The 2000 edition solved problems of 174 common mistakes and gave them a proper solution that ensured the satisfaction of the customer.

In the 2008 edition, there was necessary to clarify a number of requirements. In the end of the process, the edition was published in November 2008 with the clarifications that simplified and rearranged the requirements, such as the measuring of customer satisfaction.

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