

ISO 14000

Introduction

The International Organization for Standards (ISO) completed the Quality Management System (ISO 9000) in 1987. Its worldwide success along with increased emphasis on environmental issues were instrumental in ISO's decision to develop environmental management standards. In 1991, ISO formed the Strategic Advisory Group on the Environment (SAGE), which led to the formation of Technical Committee (TC) 207 in 1992.

The mission of TC 207 is to develop standards for an environmental management system. Like the ISO 9000 standards, which do not address the performance of the product or service, the committee used the concept that the standards addressed the process rather than the end goal. Thus, they are process standards rather than performance standards. TC 207 has established six sub-committees: environmental management system, environmental auditing, environmental labeling, environmental performance evaluation, life-cycle assessment, and terms and definitions. In addition, a working group on environmental aspects in product standards was formed. Each country has a member body of ISO, which for the United States is the American National Standards Institute (ANSI). They have designated the American Society of Testing and Materials (ASTM) and the American Society for Quality (ASQ) to administer the work of the Technical Advisor Group (TAG) and its sub-groups. Members include industry, associations, environmental groups, consultants, academicians, and government (EPA, DOE, and Department of Commerce). The chairperson of each sub-group represents the U.S. position in the respective TC 207 sub-group.

ISO 14000 Series Standards

The series is divided into two separate areas: the organization evaluation standards and the product evaluation standards. In addition, ISO 14050 covers terms and definitions that are common to both areas.

Organizational Evaluation Standards

These standards consist of three categories: Environmental Management System (EMS), Environmental Auditing (EA), and Environmental Performance Evaluation (EPE).

Environmental Management System (EMS)

ISO 14001, entitled "Environmental Management Systems--Specifications with Guidance for Use," gives the elements that organizations are required to conform to if they seek registration. This standard is the heart of the standards and will be discussed in greater detail later in the chapter. The standards given below support the EMS.

ISO 14004, entitled "Environmental Management Systems--Guidelines on Principles, Systems, and Supporting Techniques," provides supplementary material. It is for information only and is not to be used for registration.

Environmental Auditing (EA)

ISO 14010, entitled "Guidelines for Environmental Auditing -- General Principles on Environmental Auditing," provides

information for internal or external auditing. The audit is a systematic documented verification process of objectively obtaining and evaluating evidence to determine whether activities, events, conditions, systems, etc., conform to criteria and communicate the information to the organization.

ISO 14011, entitled "Guidelines for Environmental Auditing-- Audit Procedures --Auditing of Environmental Management Systems," provides information on how to plan and conduct an audit. Some topics are audit team, audit plan, implementation, and report.

ISO 14012, entitled "Qualification Criteria for Environmental Auditors Performing Environmental Management System Audits," covers information on auditor qualifications, training, and personal attributes and skills.

Environmental Performance Evaluation (EPE)

ISO 14031, entitled "Guidelines on Environmental Performance Evaluation," presents information on recording information to track performance. It helps the organization meet the requirements of ISO 14001, Section 4.5.1, Monitoring and Measuring. This standard is being drafted.

Product Evaluation Standards

These standards are under development. They consist of three categories: Environmental Aspects in Product Standards (EAPS), Environmental Labeling (EL), and Life-Cycle Assessment (LCA).

Environmental Aspects in Product Standards (EAPS)

Guide 64, entitled "Environmental Aspects in Product Standards," is designed to help writers develop product standards. Writers should carefully consider the environmental consequences when developing criteria, elements, and characteristics that go into the standard.

Environmental Labeling (EL)

ISO 14020, entitled "Environmental Labeling-Basic Principles for All Environmental Labeling," provides guidance on the goals and principles that should be used in all labeling programs. Product improvement is a desirable benefit but not the objective of the standard.

ISO 14021, entitled "Environmental Labeling-Self-Declaration of Environmental Claims: Terms and Definitions," applies to organizations that are declaring that their product has an environmental attribute such as being recyclable or energy efficient. The standard ensures that this type of labeling is accurate, verifiable, and not deceptive.

ISO 14022, entitled "Environmental Labeling-Symbols," provides a standard set of symbols for use by organizations.

ISO 14023, entitled "Environmental Labeling-Testing and Verification Methodologies," provides information on the appropriate methods to use to confirm the genuineness of the product as stated by the environmental label.

ISO 14024, entitled "Environmental Labeling-Practitioner Programs: Guiding Principles, Practices, and Certification Procedures for Multiple Criteria Programs," establishes criteria for third-party labeling or seal programs. These programs determine which products have overall environmental superiority as compared to other products.

Life-Cycle Assessment (LCA)

ISO 14040, entitled "Life-Cycle Assessment Principles and Framework," provides an overview of the practice, applications, and limitations of LCA. Life-cycle assessment attempts to determine the long-range environmental effect of a product. This assessment is an enormously difficult task because of the unforeseen and frequently controversial nature of a product's life cycle.

ISO 14041, entitled "Life-Cycle Assessment Goals and Definition/Scope and Inventory Analysis," is intended to provide guidelines for the preparation, conduct, and critical review of the life-cycle inventory analysis. This analysis involves the compilation and quantification of relevant inputs and outputs of a product system.

ISO 14042, entitled "Life-Cycle Assessment-Impact Assessment," is intended to use the results of the inventory analysis to evaluate the significance of potential environmental impacts. Currently, the body of knowledge in this area is mostly subjective.

ISO 14043, entitled "Life-Cycle Assessment Improvement Assessment," is intended to provide information to improve the total environmental performance of a product system. The development of this standard will be extremely difficult until the impact assessment standard is developed because you can't improve the product until you know the environmental impact.

The organizational evaluation standards are operational and effective because, like ISO 9000, the focus was on the process rather than the product. The development and acceptance of the product evaluation standards will be much more difficult. In particular, scientific knowledge concerning life-cycle assessment is limited.

Concepts of ISO 14001

This standard provides organizations with the elements for an environmental management system (EMS), which can be integrated into other management systems to help achieve environmental and economic goals. It describes the requirements for registration and/or self-declaration of the organization's EMS. Demonstration of successful implementation of the system can be used to assure other parties that an appropriate EMS is in place. It was written to be applicable to all types and sizes of organizations and to accommodate diverse geographical, cultural, and social conditions. As previously mentioned, the requirements are based on the process and not on the product. It does, however, require commitment to the organization's EMS policy, applicable regulations, and continual improvement.

The basic approach to EMS begins with the environmental policy, which is followed by planning, implementation and operation, checking and corrective action, and management review. There is a logical sequence of events to achieve continual improvement. Many of the requirements may be developed concurrently or revisited at any time. The overall aim is to support environmental

protection and prevention of pollution in balance with socioeconomic needs.

The standard is not intended to create non-tariff barriers or to change an organization's legal obligations. In addition, it does not include aspects of occupational health and safety management, although an organization may include these aspects in the documentation.

There are four sections to the standard-scope, normative references, definitions, and EMS requirements-and an informative annex. The EMS requirements are given in Section 4 of the standard and are covered next.

Requirements of ISO 14001

The standard is divided into six parts and has a total of 18 requirements. The numbering system is identical to the standard.

4.1 General Requirements

The organization shall establish and maintain an environmental management system that includes policy, planning, implementation and operation, checking and corrective action, and management review. These requirements are given in the rest of the standard. Because the document is available to the public and other stakeholders, the organization may wish to include in this narrative a brief description of the company. In addition, this location is a good place to include manual control and distribution.

4.2 Environmental Policy

The organization's policy statement should be based on its mission and values. It should show management commitment, leadership, and direction for the environmental activities. The statement must be relevant to the organization's nature, scale, and environmental impact of its activities, products, and services. Included is a commitment to continual improvement, prevention of pollution, and adherence to appropriate regulations and commitments. The statement provides a framework for setting and reviewing environmental objectives and targets. In addition, senior management should document, implement and maintain, and communicate to all employees the policy statement. An additional requirement states that the policy must be available to the public.

4.3 Planning

This area contains four elements: environmental aspects, legal and other requirements, objectives and targets, and environmental management program(s).

4.3.1 Environmental Aspects

The relationship among the environmental aspects, environmental impacts, and the standard is necessary for successful implementation of the standard. Environment is defined as the global surroundings in which an organization operates and includes air, water, land, natural resources, flora, fauna, humans, and their interaction. Environmental aspect is defined as an element of an organization's activities, products, or services that can interact with the environment. Examples are wastewater discharge, air emissions, and energy usage. Environmental impact is defined as any change, whether adverse

or beneficial, wholly or partially resulting from an organization's activities, products, or services. Examples are impacts on habitat, water supply, and soil erosion.

The standard requires that environmental aspects of an organization's activities, products, and services that it can control and influence be identified in order to determine the environmental impact. Those aspects that relate to significant impacts shall be considered in setting objectives. This information must be kept current.

4.3.2 Legal And Other Requirements

The standard requires the organization to have a procedure to identify and have access to all legal and other requirements to which it subscribes, such as industry codes of practice and non-regulatory guidelines. The number and complexity of regulations throughout the world can make the procedure quite complex; however, the organization need only identify those requirements that are applicable to the environmental aspects of its activities, products, and services. Examples of laws that might apply are Clean Air Act (U.S.), Public Health Act (U.K.), and Chemical Products Act (Sweden).

4.3.3 Objectives And Targets

An environmental objective is defined as an overall environmental goal arising from the environmental policy that an organization sets itself to achieve and which is quantified where practical. An environmental target is defined as a detailed performance requirement, quantified where practical and applicable to the organization or parts thereof, that arises from the environmental objectives and needs to be set and met in order to achieve those objectives. In other words, objectives (goals) are established and, from them, targets (detailed performance requirements) are determined. The organization shall establish and maintain these objectives and targets, and they shall be consistent with the policy statement, especially in regard to the prevention of pollution. An example of an objective for a paper manufacturer would be "Reduce tree cutting," and some targets would be "Increase chipper yield to 90% by 1999" and "Increase recycled material to 25% by 2001."

4.3.4 Environmental Management Program(s)

The organization shall establish and maintain a program(s) for achieving the objectives and targets. It shall include designation of the responsible function, team, or individual and a time frame for achievement.

4.4 Implementation and Operation

This area contains seven elements: structure and responsibility; training, awareness, and competency; communication; EMS documentation; document control; operational control; and emergency preparedness and response.

4.4.1 Structure And Responsibility

Roles, responsibilities, and authorities shall be defined, documented, and communicated for all personnel affecting the EMS. They must be given the freedom and authority to take the necessary actions. An organization chart is one method to show the flow of authority. A management representative must be appointed and given the authority to ensure that this standard is being met and to periodically report to senior management the status of EMS with the aim of improvement. Senior management must provide the resources in terms of people, technology, and money.

4.4.2 Training, Awareness, And Competency

Training needs should be evaluated on a regular basis, usually annually, to ensure their effectiveness. There are two types of training: general awareness and job competency. General awareness includes the importance of conformance to the EMS, the relationship of significant environmental impacts to the employees' work activities, employee roles and responsibilities, and potential consequences of failing to follow specific operating procedures. Personnel performing tasks that can cause significant environmental impacts shall be competent based on education, training, or experience. Records must be maintained to document that the training requirements have been met.

4.4.3 Communication

A key aspect of any management program is communication with all stakeholders. The standard requires that procedures shall be established and maintained for internal Communication among all employees and receiving, documenting, and responding to relevant external communication from interested parties. In addition, the organization shall consider processes for external communication of its environmental aspects and record its decision to implement those processes or not.

4.4.4 EMS Documentation

Processes and procedures need to be documented and kept current. The organization must show that it is actually practicing what the documentation states. In other words, "Say what you do and do what you say." In addition, the documentation must show the interaction of the elements and provide direction to related documents such as flow charts, check sheets, and drawings.

4.4.5 Document Control

This element requires that procedures be established and maintained to control all EMS documents. Examples are blueprints, test procedures, work instructions, and, of course, the EMS manual. Provision must be made for the review and approval of documents for adequacy before they are issued and after any changes. The purpose of document control is to ensure that appropriate and current issues of documents are in place at all locations. Obsolete documents must be removed and destroyed or stored in a safe place if retention for legal purposes is necessary. Documents shall be legible, dated, readily identifiable, and easily located.

4.4.6 Operational Control

This element aligns operations and activities with the identified significant environmental aspects, environmental policy, and environmental objectives and targets. The organization shall plan these activities to ensure that the procedures:

1. Cover situations where their absence could lead to deviations from the policy and the objectives and targets.
2. Stipulate operating criteria.
3. Cover the identification of environmental aspects of goods and services and communicate relevant procedures and requirements to suppliers and contractors.

4.4.7 Emergency Preparedness And Response

Procedures are required to identify and respond to potential accidents and emergency situations. In addition, the procedures should prevent or mitigate the environmental impact of these accidents and emergency situations. These procedures shall be reviewed and revised, if necessary, especially after an

occurrence. Where practical, the organization should test the procedures for effectiveness.

4.5 Checking and Corrective Action

This area contains four elements: monitoring and measuring, nonconformance and corrective and preventative action, records, and EMS audit.

4.5.1 Monitoring And Measuring

Effective decisions usually require quantifiable data. The organization is required to monitor and measure the key characteristics of its operations and activities in order to assess its performance in meeting environmental operations and targets. An example of a key characteristic is energy consumed, and the measurement method is kilowatts and gas/therms. Measuring equipment is of little value if it is not accurate or functioning properly. Procedures must be in place to control, calibrate, and maintain all EMS equipment whether it belongs to the organization, employee, or an outside agency. In addition, procedures are required to periodically evaluate compliance to relevant regulations.

4.5.2 Nonconformance And Corrective And Preventative Action

Procedures are required to define responsibility and authority for (1) handling and investigating nonconformance, (2) taking action to mitigate any impacts, and (3) initiating corrective and preventative action. Any action taken to eliminate the causes should be appropriate to the magnitude of the problem and commensurate with the environmental impact. In addition, any changes to the procedures should be implemented and recorded.

4.5.3 Records

Procedures are required for the identification, maintenance, and disposition of environmental records such as training, audits, and reviews. Records shall be legible, identifiable, and traceable to the activity, product, or service. They should be readily retrievable; protected against damage, deterioration, and loss; and provided with retention times.

4.5.4 EMS Audit

The purpose of this audit is to ensure that the EMS conforms to plans and is being properly implemented and maintained. Audit information should be distributed to senior management to assist in the management review process. Audit procedures should cover the scope, frequency and methodologies, and responsibilities and requirements for conducting audits and reporting results. The audit schedule should be based on the importance of the element and the results of previous audits.

4.6 Management Review

Management review and revision, if applicable, is required to ensure the continuing suitability, adequacy, and effectiveness of the EMS. Reviews should make use of information from audit reviews, performance information, changing circumstances, and the commitment to continual improvement.

EMS Benefits

EMS benefits can be categorized as global and organizational.

Global

There are three global benefits: (1) facilitate trade and remove trade barriers, (2) improve environmental performance of planet earth, and (3) build consensus that there is a need for environmental management and a common terminology for EMS.

The proliferation of national and regional standards has led to confusion and to trade barriers. This international standard will serve to unify countries in their approach to labeling, environmental management, and life-cycle assessment. This approach also will help to remove trade barriers and facilitate trade. The drafters of the standard have been careful to avoid creating a document that will hamper trade. ISO 14000 provides the framework whereby its successful promotion within countries can lead to progress that will reassure the worldwide community. As the EMS is implemented worldwide, it will increasingly satisfy concerns for environmental protection in trade discussions and agreements.

Although the standard does not specify performance, it is reasonable to expect that ISO 14000 will play a significant role in the environmental improvement of the planet. Based on the success of ISO 9000 in improving quality, we can reasonably expect that a significant improvement will occur in the environment.

As the environmental standards are developed and implemented worldwide, it will build worldwide consensus that there is a need to use ISO 14000. In addition, a common terminology allows people in different countries to speak to each other, thereby sharing improvement ideas, prevention information, and system problems.

Organizational

An organization benefits from an environmental management system in a number of ways, and some are given below: Assuring customers of a commitment to environmental management.

- ☞ Meeting customer requirements.
- ☞ Maintaining a good public/community relations image.
- ☞ Satisfying investor criteria and improving access to capital.
- ☞ Obtaining insurance at reasonable cost.
- ☞ Increasing market share that results from a competitive advantage.
- ☞ Reducing incidents that result in liability.
- ☞ Improving defense posture in litigation.
- ☞ Conserving input materials and energy.
- ☞ Facilitating the attainment of permits and authorization.
- ☞ Improving industry/government relations.

In addition, there is a feeling that the organization is doing the right thing.

Additional Comments

Many aspects of ISO 14000 are basically the same as ISO 9000. The reader is referred to ISO 9000 for information on (1) implementation, (2) writing the documents, (3) internal audits, and (4) registration. For the most part the word environment can be substituted for the word quality.