Sustainable Practices in Textile Industry: Standards and Certificates

K. Amutha

Abstract "Sustainability is achieved when all people on Earth can live well without compromising the quality of life for future generations"—Rolf Jucker, "A Vision for a Sustainable University". To sustain is to strengthen or in other words is to support or to make comfortable. Every human has his own choices or preferences and would like to lead a comfortable life. But this comfort should not be achieved at the cost of other's discomfort or sufferings. The concept of sustainable development insists on conservation of resources for the future generations. Nature, earth, biodiversity, and ecosystems need to be sustained for harmonious life at the present as well as the future. Textile Industry is a fast growing industry in the twenty-first century both in terms of production volume and employment, and hence, the industry's impact is huge on the society, economy, and environment. Also, textile industry is a thirsty industry with huge consumer of water, a resource that is becoming scarce day by day. The textile industry is indicted to be one among the most polluting industries, and hence, it becomes mandatory to adopt sustainable practices in order to conserve the Mother Nature. At present, most of the industry practices are modified or transformed in order to achieve sustainability, and for these, standards are indispensable. Sustainable practices in textile industry include using less amounts of water, hazardous chemicals, pesticides, and fertilizers; adopting eco-friendly production processes; using less energy for production processes; and introducing 3 Rs—Reduce, Reuse, and Recycle. Society is also gaining awareness on green consumerism and looking for ecoproducts. Sustainability standards and certificates are concerned with the safety of the consumer, the manufacturer, the society, and the environment at large. The standards are developed after cautious research, and certificates are issued up on proper implementation of these standards. This chapter gives an overview of various standards applicable to the textile industry; certification of textile products; the way the standards lead the industry towards sustainability; the elements of sustainable development, and so on.

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1 Introduction

This chapter gives a brief idea about the standards and certificates that are applicable to the textile industry. Standardization is the process by which rules and regulations are developed and applied for a particular activity, in a consistent and reliable manner; it is achieved by the cooperation of all stakeholders and for their benefit. Standardization comprises of a chain or cycle of procedures implemented by individuals who work as a group to achieve the committed objective. All these standards guide and lead the industry towards environmental sustainability. Standards help to save cost, time, and energy. They also serve as reliable benchmark by which performance can be compared or judged. International Organization for Standardization (ISO) defines standard as "a document that provides requirements, specifications, guidelines, or characteristics that can be used consistently to ensure that materials, products, processes, and services are fit for their purpose".

Kanti Jasani, president of Performance and Technical Textile Consulting, insists the industry to assume implementation of sustainable practices as yet another quality programme. According to him, sustainable textile products should inevitably be quality products. He also states that quality programmes such as Lean and Six Sigma help the implementers to cut down unnecessary steps in production process and add that these concepts are essential for sustainability.

This chapter focuses on the standards and certificates for sustainable development in the textile industry and across the textile supply chain. The primary motive of these standards is to standardize the procedures and practices followed by the industry, in order to achieve sustainability. The requirements are clearly defined in the standard, and implementation is checked through audits and certified upon compliance.

2 Global Organic Textile Standard (GOTS)

GOTS is a standard for processing organic fibres through the entire supply chain, beginning from the harvesting of the raw material (fibre) up to the finished (final) product being sold to the consumer. It is followed by many manufacturers around the world, and hence, the products with GOTS certification are accepted widely in the international market. GOTS certification requires social compliance in addition to the environmental compliance. The dyestuffs, chemicals, and reagents used for dyeing and finishing should meet both environmental and toxicological criteria. It is mandatory for wet processing units to have effluent (wastewater) treatment plant (Fig. 1).

Fig. 1 GOTS logo. *Source* www.global-standard.org

Brief History of GOTS

May 2005: First version of GOTS was published,
Oct 2006: Commencement of GOTS certification system,
June 2008: Second version (2.0) and label of GOTS were introduced,
March 2011: Third version (3.0) was published, and
March 2014: Fourth version (4.0) was published.

Product Categories

All the textile and allied materials and products are being classified into the following nineteen categories. This categorization eases the process of certification.

1. Accessories	8. Ladies' wear	15. Technical textiles
2. Baby wear	9. Leisure wear	16. Toys
3. Children's wear	10. Men's wear	17. Underwear
4. Fabrics	11. Non-wovens	18. Yarn
5. Garments	12. Raw fibres	19. Others
6. Home textiles	13. Socks	
7. Hygiene products	14. Sports wear	

Fields of Operation

The manufacturing processes are categorized into the following seventeen fields which help in defining the criteria and standards based on the field of operation.

1. Dyeing	7. Mail order selling	13. Spinning
2. Exporting	8. Manufacturing	14. Storing
3. Finishing	9. Post-harvest handling	15. Trading
4. Ginning	10. Printing	16. Weaving
5. Importing	11. Processing (other)	17. Wet processing
6. Knitting	12. Retailing	

GOTS Labels

GOTS offers two label grades for textile products that are only produced according to the standard (Figs. 2, 3 and 4).

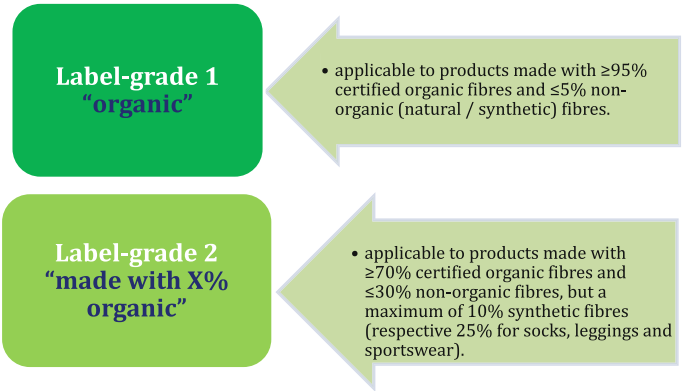

Fig. 2 Two types of GOTS label

Fig. 3 GOTS label (organic). *Source* www.global-standard.org

The entity who applied for GOTS certification has to undergo inspection by certified bodies, and upon compliance with the standard, the entity would be certified. Then, the final products can be labelled with a suitable label.

Certification

Certification process includes on-site inspection and monitoring system that ensures the credibility of the GOTS label. Any textile manufacturing, processing, or trading entity can apply for GOTS certification through any GOTS approved certifying body.

Fig. 4 GOTS label (x% organic). *Source* www.global-standard.org

Certifying Bodies

There are totally eighteen approved certifying bodies for GOTS, spread across the globe. The certifying bodies are independent and special accredited bodies and are authorized to certify on the basis of four different scopes as follows:

1. Mechanical textile processing and manufacturing operations and their products,
2. Wet processing and finishing operations and their products,
3. Trading operations and related products, and
4. Release of positive lists of chemical inputs (dyes and auxiliary agents) to the chemical industry.

GOTS Monitor (Water/Energy)

In terms of sustainable development for the textile manufacturers, especially the wet processors, the two most important facets are consumption of water and energy. Hence, it becomes mandatory for the applicant of GOTS certification to provide necessary data about the energy and water resources used for production and their consumption per kilogram of textile output. In order to support and monitor the certified unit, GOTS monitor acts as a valuable tool. The core functions of GOTS Monitor are as follows:

- To offer easy ways to collect data on consumption of energy and water to produce one kilogram of textile material or product.
- To give benchmark values (practical and factory-specific), particularly for wet processing units.
- To offer support to set and monitor rational targets to minimize the consumption of water and energy.

3 American National Standards Institute (ANSI) Standards

ANSI was established in the year 1918. It is the official US representative to the ISO. It is a non-profit organization for the US voluntary consensus standards community. It is a neutral forum that ensures reliability of the standards and the compliance evaluation system.

- NSF: National Sanitation Foundation—founded in 1944.
- Renamed as NSF International in 1990 and expanded its services across the globe.
- NSF is a self-governing organization whose mission is to protect and improve global human health.
- It tests the quality and certifies products and establishes standards for food, water, and consumer goods industries.
- NSF is also a third-party certification body for organizations and businesses.
- NSF guides the organizations throughout the certification process to achieve high-quality results in a cost-effective, reliable, and consistent manner.

3.1 NSF 140—2015: Sustainability Assessment for Carpet

NSF/ANSI 140 is a leading standard for the carpet industry. This standard is pertinent to evaluate the sustainability and certify the carpet products through their entire life cycle. This standard was developed by the NSF—National Centre for Sustainability Standards (NCSS) through a consensus base public process with a multi-stakeholder group of participants. This standard guides the carpet manufacturing organization towards more sustainable carpet production and defines the performance requirements for both the individual product and the organization as a whole. Prerequisite requirements are being established, and the commercial carpet products are evaluated against these requirements. The evaluation process is based on the life cycle assessment (LCA) principles, and for this, NSF/ANSI 140 makes use of a point system in six key areas (Fig. 5):

Fig. 5 NSF 140 label.
Source www.nsf.org

(i) Public health and environment,
(ii) Energy and energy efficiency,
(iii) Bio-based, recycled content materials, and environmentally preferable materials,
(iv) Product Manufacturing,
(v) Reclamation and end-of-life management, and
(vi) Innovation.

Based on the total point scores, the certificate is issued at three different levels:

- Silver,
- Gold, and
- Platinum.

NSF certified manufacturers are approved to use the NSF Sustainability Certified label on their products as well as for advertisement purpose.

3.2 NSF 336—2011: Sustainability Assessment for Commercial Furnishing Fabric

NSF/ANSI 336 is engaged for the evaluation and certification of sustainability of commercial furnishing fabrics through the entire product life cycle. This standard was developed by the NSF–NCSS. The standard was developed by a consensual process with the participation of multi-stakeholder group that includes (Fig. 6):

- manufacturers,
- suppliers,
- regulatory agencies,
- academicians, and
- other industry participants.

NSF/ANSI 336 standard deals with the environmental, economic, and social aspects of furnishing fabric products. This standard is used to assess the product (furnishing fabrics) characteristics in terms of input materials and components, use

Fig. 6 NSF 336 label.
Source www.nsf.org

of water and energy, practices adopted for recycling, and social accountability. NSF/ANSI 336 is based on LCA principles. Accordingly, the furnishing fabrics are evaluated against preset requirements using a point system in eight key areas as mentioned below:

(i) Fibre sourcing,
(ii) Safety of materials,
(iii) Water conservation,
(iv) Water quality,
(v) Energy,
(vi) Air quality,
(vii) Recycling practices in manufacturing and end of use, and
(viii) Social accountability.

This standard is applicable to

- Commercial fabrics generally used in offices, hospitality, healthcare centres, and institutional interiors.
- Woven, non-woven, knitted, bonded, felted, and composite materials used in upholstery, vertical window, furniture system, wall, drapery, cubicle, and top of the bed fabrics.
- Fabrics manufactured in one or multiple amenities and in one or multiple countries (Fig. 7).

Based on the total point scores, the certificate is issued at four different levels:

- Compliance,
- Silver,
- Gold, and
- Platinum.

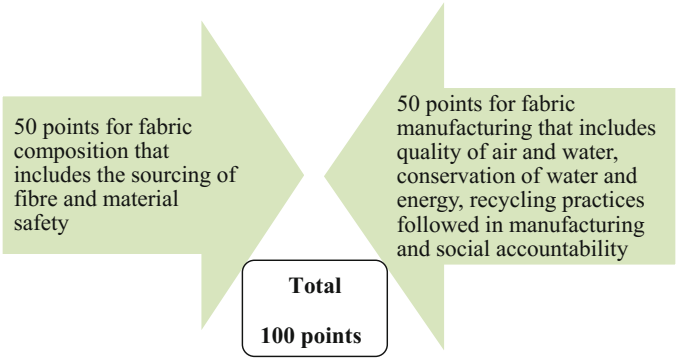

Fig. 7 Score points for NSF 336 standard

4 OEKO-TEX® Certification

OEKO-TEX® is an international association established in 1992 and has 15 textile research and test institutes in Europe and Japan. There are more than 50 local offices spread over 60 countries around the world. The standards are applicable for various textile products to ensure human health. The textile industry is extremely fragmented with each production stage being located at different places of the world, and this complex supply chain calls for some international regulation; hence, Oeko-Tex fulfils it. Oeko-Tex standards are based on the textile ecology which is divided into four segments as follows (Fig. 8).

4.1 OEKO-TEX® Standard 100

The OEKO-TEX® Standard 100 is an independent system that tests and certifies the materials or products in the entire textile supply chain that includes raw materials, intermediary, and finished products. All the items are tested for the presence of harmful substances and certified up on compliance with the standard. The criteria catalogue of testing for harmful substances is standardized globally. It is amended and extended on regular basis (Fig. 9).

Materials or products suitable for OEKO-TEX® certification are as follows:

- Greige, dyed, and finished yarns.
- Greige, dyed, and finished fabrics (woven and knit).
- Ready-made articles (all types of clothing, domestic and household textiles, bedlinen, terry cloth items, textile toys, and more).

Criteria

Testing for harmful substances includes the following:

- Illegal substances (banned dyes, chemicals, etc.),
- Legally regulated substances,
- Known harmful (but not legally regulated) chemicals, and
- Parameters for health care.

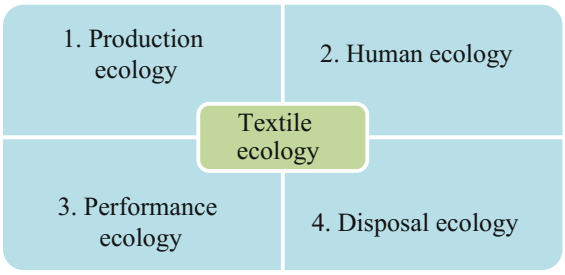

Fig. 8 Classification of textile ecology

Fig. 9 OEKO-TEX 100 label. *Source* www.oeko-tex.com

Product Classes

OEKO-TEX® Standard 100 employs different test methods for the assessment of harmful substances, and these test methods are chosen based on the end use of the textile. Based on the human ecological requirements, the textile product that comes into close contact with the skin is given more importance. According to this standard, the tested textile products are classified into four different product classes as follows (Fig. 10).

Certification

The textile product to be certified as per OEKO-TEX® Standard 100 has to be tested for harmful substances, and certification will be done only upon compliance with the required criteria. The testing has to include all the components or materials of the final product which includes fabric, sewing threads, linings, prints, and also non-textile accessories such as buttons, zip fasteners, and rivets. No exception is allowed.

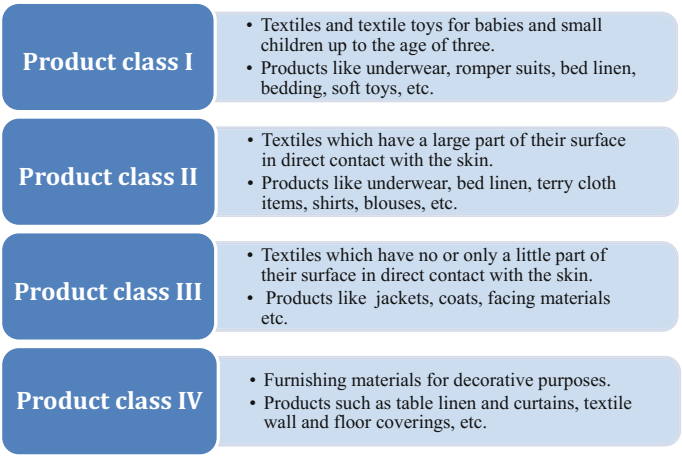

Fig. 10 Classification of products according to Oeko-Tex 100 Standard

Modular System

According to OEKO-TEX® Standard 100, textile products can be tested and certified at any stage of production including accessories manufacturing.

Certificates are issued for:

1. Raw materials,
2. Fibres,
3. Filaments,
4. Yarns,
5. Grey (raw) and finished textile fabrics,
6. Ready-made products (Garments), and
7. Textile and non-textile accessories.

While certifying a finished product, raw materials or intermediate products which have already been tested and certified are exempted from retesting, and for this, the certificate and representative sample materials have to be presented as proof. This modular principle avoids double testing and saves cost and time. It is the responsibility of the manufactures to sustain the human ecology and to maintain the quality of the merchandize by choosing the right ingredients at every stage of production.

Ready-Made Articles

Though all the elements have been tested and certified already, consistent with OEKO-TEX® Standard 100, ready-made articles are required to have their own licence number; that is, the final product is marked with neither the several OEKO-TEX® labels nor the certificate number of individual components. The manufacturers of ready-made articles have to assure compliance of their product with the obligation of OEKO-TEX® criteria catalogue in all the individual cases and at the same time integrate these procedures into their normal quality assurance system.

4.2 Sustainable Textile Production (STeP)

Sustainable textile production (STeP) has been introduced by OEKO-TEX® certification system for the benefit of manufacturers of branded goods, retailers, and other organizations in the textile supply chain. It serves as a means to communicate the achievements of the textile organizations concerning sustainable production to the public. The certification process is transparent, reliable, and apparent. STeP certification is applicable to all stages of textile goods production that begins from fibre production and extends through the processes of spinning, weaving, knitting, processing (dyeing/printing and finishing), and finally the ready-made textile production (Fig. 11).

Fig. 11 STeP label. *Source* www.oeko-tex.com

The main aim of STeP certification is to implement eco-friendly production processes permanently and also ensure optimal health and safety and working conditions that are socially adequate. The STeP standard is vibrant and keeps improving based on the technological changes. Benchmarks are validated frequently, and this helps the certified companies for continual improvement of environmental protection, social responsibility, and efficiency. As a result, the companies are able to attain the best position in the market which is highly competitive.

STeP acts as a source for global brands and retailers to look for suitable suppliers around the world who comply with their requirements concerning environmental protection and social responsibility. This facilitates all the organization in the supply chain to ensure sustainability jointly and also document their commitment clearly and completely.

STeP certification helps to improve the efficiency of the production processes of the textile and clothing manufacturers. It also enables the organizations to find out their position with respect to sustainability and points the areas to be improved. The certification is independent and acts as a proof of sustainable production and builds brand image. It allows the companies to enter into new markets and improves relations through the supply chain.

Comprehensive approach—textile-specific criteria

While most of the certification systems account for only individual aspects of sustainability, STeP, in contrast, focuses on widespread, complete analysis and assessment of production processes and conditions in a sustainable manner. Another advantage is that the STeP certification adapts criteria that specially suit the textile industry situations. For wide application of STeP certification, it has to assure that the criteria specified are comparable at international level and standardized accordingly. The standardization process includes continual analysis, evaluation, and updating whenever required, for example, in case of new market development, when legal regulations are passed/changed, upon new scientific or technological innovations.

Evaluation

The STeP certification is offered by the institutions who are members of the International OEKO-TEX® Association, and these institutes are spread across the world. There are totally sixteen member institutes and representative offices

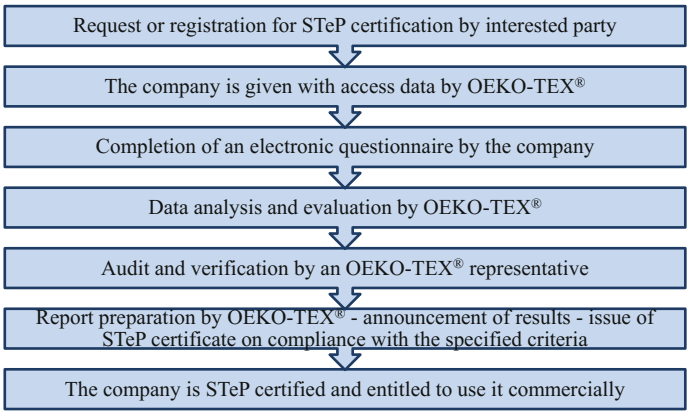

Fig. 12 STeP certification process

worldwide. These institutes are independent but accredited by OEKO-TEX® Association to carry out textile testing and certification. They are highly competent and well experienced in the textile industry.

Certification

The STeP certification process includes the following 7 steps (Fig. 12).

Duration of the Certification

It takes about three months to complete the above seven step process of certification. The duration varies according to the production facility and the individual situations. For example, if the data could be collected fast, the time taken is less and vice versa; if certain individual business areas are already certified, then the process ends faster.

Certification Cost

The expenditure for STeP certification varies based on the following:

- the scope of the company in terms of size and production volume,
- the criteria to be tested at every production stage, and
- prior implementation measures for environmental protection and social responsibility by the company.

The certification cost includes expenses for support services rendered by the OEKO-TEX® institutes during the application, evaluation, audit process (preparation, implementation, and documentation), certificate issue, and also an authorization fee.

Certificate

A STeP certificate is issued for a period of three years and subject to further extension. The prerequisite for STeP certification is that the company has to comply with the minimum requirements specified and the requirements are classified into the following six modules or areas.

Management of chemicals

- Meet the guiding principle of restricted substances list (RSL),
- Appropriate management for harmful substances,
- Implement the principles of "green chemicals",
- Regular training for handling of the chemicals,
- Commitment to communicate about the risks involved in using chemicals, and
- Supervision of chemicals in use.

Environmental performance

- Not exceeding the specified limit values,
- Make use of best available production technologies,
- Optimization of production processes,
- Use the resources efficiently,
- Responsible handling of waste, wastewater, emissions, etc., and
- Reduction of the CO_2 footprint.

Environmental management

- Documentation and implementation of a right environmental management system,
- Assurance of environmental targets,
- Conception of environmental reports periodically,
- Appointment of an environmental representative,
- Periodic training for the implementation of environmental targets, and
- Implementation of existing environmental protection systems such as ISO 14001.

Social responsibility

- Ensuring socially acceptable working conditions as per the UN and ILO conventions,
- Implementation of performance appraisals for all the employees,
- Implementation of existing social standards like SA 8000, and
- Assured training for employees concerning the social issues of an operation.

Quality management

- Implementation of a suitable quality management system like ISO 9001,
- It is necessary that the flow of goods and products be traceable with proper documentation and responsibility, and
- Use of advanced management practices like risk management or corporate governance.

Health and safety

- Appropriate measures to ensure health and safety of workers in the workplace (e.g. gloves, masks, filter systems, and ear protection),
- The buildings and production plants are assured for safety (e.g. fire alarms, emergency exits, and restricted areas),
- Measures for prevention of risk, and
- Implementation of existing safety standards like OHSAS 18001.

Assessment

The companies have to provide a number of data and parameters to OEKO-TEX® for satisfactory evaluation of the sustainability of production processes. Data are being collected through Web, and an evaluation tool is used to assess the data. After applying to an OEKO-TEX® institute, the company receives the necessary access data which enables them to send the information through an online questionnaire. Then, the institute would evaluate the data and send the report in detail about the results. Then, the company can proceed to the next stage by either following the procedure for sustainable production or implementation of the certification process to achieve the STeP label.

Scoring

STeP certification is offered at three different levels based on the degree of sustainable production and working conditions:

- Level 1 = entry level,
- Level 2 = good implementation with further optimization potential, and
- Level 3 = exemplary implementation.

The assessment results are presented in a detailed manner so that the company can know its position in terms of sustainability. It also demonstrates the particular areas that have additional potential for optimization.

Audits

The company provides necessary data and information for the assessment, and these data are analysed and evaluated by the OEKO-TEX® institute. OEKO-TEX®

institute has a person in charge to carry out the verification through audit at the production capacity.

The internal quality management of OEKO-TEX® is comprehensive, and it ensures audit results of global standards. For this purpose, the auditors are offered joint training and further education regularly and also the technical OEKO-TEX® expert groups meet annually.

Verification

OEKO-TEX® carries out audits at different points of time as follows:

- Initial auditing at the time of application,
- Routine audits at the time of extension,
- Intermediate/compliance audits, and
- Unannounced audits at the production facility.

4.3 Made in Green by OEKO-TEX®

Made in Green is a label for textiles. It operates independently and is suitable for finished textile goods and semi-finished or intermediate products at all levels of the textile supply chain. It ensures that the products are made of materials free from harmful substances and the processes employed for manufacturing are environmental friendly, and the working conditions are safe and socially responsible. This single label replaces both the OEKO-TEX® Standard 100 and Made in Green by Aitex. This label is applicable to any kind of clothing and furnishings; either the item is a finished or semi-finished product at any level of the textile supply chain (Fig. 13).

The Made in Green label by OEKO-TEX® confirms that the product carrying this label is tested for harmful substances and found to be within the tolerable limits; also, sustainable production processes are followed as per the guidelines of OEKO-TEX®. Every piece of article carrying the Made in Green label possesses a product ID which is unique and also serves as a means of traceability and transparency to the consumer. It gives details such as the production facility employed, the stage of production, and the countries where the manufacturing processes were carried out.

Fig. 13 Made in Green label.
Source www.oeko-tex.com

Validity

The Made in Green label is valid for a year after which it must be reissued.

Additional Benefits

- This label could be used directly by innovative leaders for the promotion of new functions and features of their products and as a means to emphasize their close partnership with suppliers.
- A key factor for the successful implementation of sustainability is the reliable relationship between the supplier and the manufacturer. The sustainability criteria include quality of the product, educating and training the employees at regular intervals, and improved working environment. The Made in Green label conveys all these to the customer.
- Made in Green label makes the entire supply chain of the company transparent and acts as a sign of trust that the suppliers from other countries also stick to the quality standards as per the guidelines and work principles.
- Though the Made in Green label is a mark of the existing sustainability of the supply chain, the companies may work further towards continuous improvement for achieving greater sustainability at individual production units.

Control Tests

In cases where all the textiles are certified by OEKO-TEX® Standard 100, control tests are performed before the products are labelled with Made in Green label. In addition to this, random checking is done during unannounced company audits. These unannounced company audits are performed as a measure to verify whether the existing STeP certification complies with both the environmental and social criteria.

5 ISO 14000 Environmental Management

The ISO 14000 is a collection of standards that offers practical tools for manufacturers or businesses of all categories who are interested to improve their environmental management responsibilities. The chief standard ISO 14001:2015 and its supporting standards like ISO 14006:2011 are developed in order to achieve this. There are many other standards in the family whose focus is on specific activities such as audits, communications, labelling and life cycle analysis, and also environmental challenges like climate change (Fig. 14).

Fig. 14 ISO 14001 label.
Source www.iso.org

5.1 ISO 14001 Environmental Management System

ISO 14001 is a global standard for implementation of environmental management systems and is based on the four-step method called Plan–Do–Check–Act (PDCA cycle or Deming cycle).

ISO 14001 Certification

Any organization interested to be certified by ISO 14001: environmental management system (EMS) should comply with all the clauses of the standard. For this, the company has to develop guidelines, set of rules, and procedures in order to make sure that it has only minimum or less impact on the environment.

Benefits of ISO 14001 Certification

ISO 14001 certification of any organization assures that it meets the international environmental standards as stipulated by environmental management system (EMS) which is industry-specific in nature. This standard and certification are applicable to any company irrespective of the size, large or small; both manufacturing and service sectors; traders; and different types of industries.

Key Benefits of ISO 14001

- Help in management of resources, energy, and waste as a measure of cost reduction,
- Reliable and build a corporate image,
- The impact on the environment is measured, scrutinized, and controlled,
- Comply with the regulations and create awareness,
- The environmental performance of the whole supply chain improves,
- Serve as a protective tool,
- Cut down the insurance costs, and
- Attract customers and business partners.

ISO 14001 Certification

The ISO 14001 EMS certification is accomplished through an audit process which comprises of two stages:

- ISO 14001 Stage 1: Preassessment
- ISO 14001 Stage 2: Certification

ISO 14001 EMS certificate will be issued only on successful completion of the audit process. The certificate once issued is valid for three years, and every year mandatory audits are conducted in order to ensure compliance. By the end of the valid period, a reassessment audit is required to get certified for the next span of three years.

The ISO 14001 EMS certification requires a company to have the following ISO 14001 compliant documents, procedures, processes, and policies:

- Environmental manual,
- Environmental policy,
- Environmental aspect and impact procedure,
- Environmental legal and other requirements procedure,
- Environmental objectives, targets, and programmes,
- Adequate resources to maintain the EMS,
- Communication, documentation, and record procedures,
- Environmental compliance and internal audit procedures,
- ISO 14001 operational control and emergency procedures,
- Environmental monitoring,
- ISO 14001 nonconformity, corrective, and preventative action, and
- EMS management review.

5.2 *ISO 14020 Environmental Labelling*

ISO 14020 consists of a series of standards that provides global recognition for business organizations. They also offer credible international benchmarks against which the organizations set standards for labelling of their products (Fig. 15).

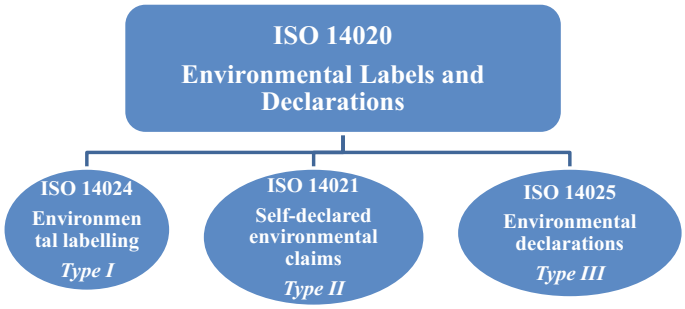

Fig. 15 ISO 14020 group of standards

5.2.1 ISO 14024 Environmental Labels and Declarations: Environmental Labelling—Principles and Procedures

ISO 14024 is a global standard established for environmental labelling which includes selection of:

- Product categories,
- Product environmental criteria, and
- Product function characteristics.

It is commonly termed as "ecolabelling". This standard serves as a benchmark for the Global Ecolabelling Network (GEN). The selection of product categories for ecolabelling begins with a feasibility study for establishing the product categories and then the preparation of proposal (specifically for the interested parties) which summarizes all its components, findings, and the considerations. The selection of product environmental criteria deals with the decisions on final criteria based on the standard which links the stages of product life cycle and the major environmental indicators. During this process, factors such as neighbouring, provincial and international environmental issues, existing technology, and economic aspects are taken into consideration. The process of ecolabelling comprises of:

(i) Identification of the product life cycle stages based on the environmental impacts and analysis to ensure adequacy.
(ii) Allotment of weighting factors for the selected environmental requirements and statement of explanation and justification for each weighting factor.
(iii) Determination of the criteria that accurately reflect the particular environmental aspects and assignment of numerical values to them using either scale point system or other relevant approaches.
(iv) Stipulation of test methods for any given criteria and examination of the available laboratories capable of performing the tests.

5.2.2 ISO 14021 Environmental Labels and Declarations: Self-Declared Environmental Claims

ISO 14021 finds wide applications that deal with the voluntary, self-declarative, and environmental claims for not only manufactured products but also services such as banking and tourism. The chief goal of ISO 14021 is the harmonization of the use of environmental claims (self-declared) with the following expected benefits:

- Precise and provable environmental claims,
- Encouragement for improvement of the environment,
- Avoiding unjustifiable claims,
- Lessening uncertainty in market,
- Assistance in international trade, and
- Variety of choice for consumers.

The basic rules for environmental claims are expressed through three key elements as follows:

1. *Use of symbols*: the claim is not just expressed as text but also with pictures, symbols, or logos.
2. *Evaluation and claim verification requirements*: it is indispensable to verify the claims before they are made and is made accessible to anyone on request.
3. *Specific requirements for selected claims*: it is suitable for certain claims that are used frequently, e.g. recyclable and biodegradable.

Specific Requirements for Selected Claims

The final element of the standard is the specific requirements for selected claims, for example:

- Degradable,
- Recyclable,
- Recycled content, and
- Reduced energy/water consumption.

The standard was originally published in 1999 and was amended/revised and published in 2011 that reflects the marketplace developments with the addition of the following terms, qualifications, and evaluation methodology:

- Renewable material,
- Renewable energy,
- Sustainable,
- Claims relating to greenhouse gas emissions,
- Product "Carbon footprint", and
- "Carbon neutral".

5.2.3 ISO 14025 Environmental Labels and Declarations: Environmental Declarations—Principles and Procedures

ISO 14025 is a standard of Type III environmental declaration which takes life cycle data as the basis for the establishment of principles and procedures. A Type III environmental declaration can be described as computation of environmental data for a product with preset categories of parameters based on the ISO 14040 series of standards, but not excluding additional environmental information. Type III environmental declarations state the environmental performance of a product which facilitates comparison with other products of similar functionality. These declarations:

- Are based on verified LCA data, life cycle inventory analysis (LCI) data, and life cycle impact assessment (LCIA) of a product.
- Are developed using predetermined parameters.
- Are subject to the administration of a programme operator.

5.3 ISO 14044 Environmental Management—Life Cycle Assessment

ISO 14044:2006 is an international standard that specifies requirements and provides guidelines for life cycle assessment (LCA) including the following:

- definition of the goal and scope of the LCA,
- the life cycle inventory analysis (LCI) phase,
- the life cycle impact assessment (LCIA) phase,
- the life cycle interpretation phase,
- reporting and critical review of the LCA,
- limitations of the LCA,
- relationship between the LCA phases, and
- conditions for use of value choices and optional elements.

This standard is applicable to both manufactured products (termed as goods), including the raw materials and the intermediate products and services. The three key criteria for LCA are mass, energy, and environmental significance.

6 Textile Exchange (TE) Standards

Textile Exchange is an international, non-profit organization whose mission is to motivate and organize people to speed up sustainable practices in the textile value chain and transform the textile industry towards sustainability. The TE focuses on minimization of harmful impacts of the textile industry across the globe and maximization of the positive effects. It works on identifying the best practices for the textile chain in order to minimize the impacts on human and environment. Companies willing to be more sustainable may join the TE.

6.1 CCS—Content Claim Standard

This is a voluntary, international standard which acts as a tool to validate content claims of textile products. The core objective of the Content Claim Standard (CCS) is to confirm or verify the accuracy of content claims (Fig. 16).

Fig. 16 CCS label. *Source* www.textileexchange.org

1. CCS ascertains the nature and quantity of the raw materials used for production so that the final product content is claimed accordingly.
2. CCS is applicable to all the products whose content varies from 5 to 100 % of the claim.
3. CCS is versatile and suitable for any material along any supply chain.
4. CCS protect the reliability and uniqueness of the claimed material.
5. The standard gives chain of custody certification.

The Content Claim Standard is applicable to organizations who would like to exhibit the legitimacy and validity of the content of the material used to make products. The organization may be the manufacturer, buyer, or seller of the product. The standard offers verification by third-party organization for the content claim of the product. It also pays attention to the flow of materials or goods inside the production facility and also goods purchased from other sources. The standard includes processes such as manufacturing, storage, handling, and shipping. The CCS should be used in cases where a claim cannot be backed up by another standard or recognized testing method, or when other verification methods are not in place (internal track and track systems, genetic markers, etc.).

6.2 OCS—Organic Content Standard

Textile Exchange is the publisher of the Organic Content Claim (OCS). This standard acts as a replacement for the OE 100 and OE blended standards from 19 may 2013. ECOCERT purposes the certification of textiles made with organic grown materials according to the Organic Content Standard. The objective of this standard is to assure the traceability and reliability of the raw materials during all the manufacturing stages (Figs. 17 and 18).

Fig. 17 OCS label. *Source* www.textileexchange.org

Fig. 18 OCS (blended) label. *Source* www.textileexchange.org

Two different labels are offered by the standard according to the composition.

1. OCS 100 logo is used for only product that contains 95 % or more organic material.
2. OCS blended is used for products that contain 5 % minimum of organic material blended with conventional or synthetic raw materials.

6.3 RDS—Responsible Down Standard

The textile industry has become more and more aware of the challenges in sourcing. Particularly, sourcing is complex for animal products such as feather and down, wool, angora, cashmere, and leather. To make the sourcing easier and more sustainable, the Responsible Down Standard (RDS) was developed and it serves to be a primary standard for animal welfare in down and feather products. With the global expertise of Control Union, services are offered for all animal products integrated in textiles (Fig. 19).

The standard is owned and managed by Textile Exchange. The RDS has been developed by Control Union, The North Face, and Textile Exchange through a wide stakeholder review process, which involved among others worldwide down supply chain members and major animal welfare organizations. The standard development process included pilot audits at all levels of a typical down supply chain and therefore resulted in a scalable standard enabling worldwide applicability by any type of operation (farm, slaughterhouse, processor, trader, collector, garment manufacturer, etc.) in the down supply chain.

Fig. 19 RDS label. *Source* www.textileexchange.org

The scope of the RDS includes the complete down supply chain—from the farms and slaughter facilities (animal welfare) to the down processors and garment factories (traceability).

Down certified according to RDS shall:

Not be sourced from waterfowl which were force-fed and/or live-plucked,
Be sourced from waterfowl raised respecting animal welfare aspects based on the five freedoms for farm animals, and
Include transparency along the complete supply chain with an integrated traceability.

6.4 GRS—Global Recycle Standard

The Global Recycle Standard (GRS) was originated by Control Union and now managed by Textile Exchange. This standard is proposed to establish independently verified claims as to the amount of recycled content in a yarn. Additional importance is given in prohibition of specific chemicals, materials that need water treatment, and safeguarding the rights of workers and also inclusion of weaver into the standards (Fig. 20).

- It is mandatory to keep full records of the use of chemicals, energy, water consumption, and wastewater treatment including the disposal of sludge;
- All prohibited chemicals listed in GOTS are also prohibited in the GRS;
- All wastewater must be treated for pH, temperature, COD, and BOD before disposal; and
- More importance being given to worker's rights.

The GRS provides a track and trace certification system to ensure that the claims made about a product can be officially backed up. It consists of a three-tiered system:

- Gold standard—products contain between 95 and 100 % recycled material;
- Silver standard—products contain between 70 and 95 % recycled product;
- Bronze standard—products have a minimum of 30 % recycled content.

Fig. 20 GRS label. *Source* www.textileexchange.org

6.5 RCS—Recycled Content Standard

The RCS is used as a chain of custody standard to keep track of recycled raw materials through the supply chain. The standard was developed by the Materials Traceability Working Group, part of OIA's Sustainability Working Group. The RCS uses the chain of custody requirements of the Content Claim Standard (Fig. 21).

The RCS uses the ISO 14021 definition of recycled content, with interpretations based on the US Federal Trade Commission Green Guides, the intention of which is to comply with the most widely recognized and stringent definitions. Sellers of RCS products are advised to reference the allowed recycled content claims in the countries of sale, to ensure that they are meeting all legal product claim requirements.

The RCS does not address other inputs, environmental aspects of processing (such as energy, water, or chemical use), any quality or social issues, or legal compliance. Intended users of the RCS are recyclers, manufacturers, brands and retailers, certification bodies, and organizations supporting recycled material initiatives.

6.6 RWS—Responsible Wool Standard

Wool is a significant fibre in the textile industry with a long history and an even longer future. It is a versatile fibre with good comfort and performance characteristics. Hence, it has a wide range of applications and preferred by most consumers. Wool owes its unique properties to the sheep that grow it, and we owe it to the sheep to ensure that their welfare is being protected. To this end, Textile Exchange is developing the Responsible Wool Standard.

The RWS is being developed through an open, multi-stakeholder process. The International Working Group represents the broad spectrum of interested parties, including animal welfare groups, brands, farmers, wool suppliers, and supply industry associations, covering both apparel and home categories. The goals of the Responsible Wool Standard are to provide the industry with the best possible tool to:

Fig. 21 RCS label. *Source* www.textileexchange.org

- Recognize the best practices of farmers around the globe,
- Create an industry benchmark for animal care and land management to drive improvement where needed,
- Ensure that wool comes from farms with a progressive approach to managing their land and from sheep that have been treated responsibly,
- Provide a robust chain of custody system from farm to final product so that consumers are confident that the wool in the products they choose is truly RWS.

7 Cradle to Cradle Certified Standard

Cradle to Cradle Certified™ is a standard for assessment of product quality in terms of product design and safety for the consumer and the environment, by multiple aspect approach. The evaluation process includes both the materials used and the manufacturing practices on the basis of the following five attributes (Fig. 22):

1. Material health,
2. Material reutilization,
3. Renewable energy and carbon management,
4. Water stewardship, and
5. Social fairness.

The core objectives of Cradle to Cradle® design are waste elimination and product development for closed-loop system. The certification validates by external means, and the certificate is issued at five different levels:

- Basic (provisional),
- Bronze,
- Silver,
- Gold, and
- Platinum.

Fig. 22 Cradle to Cradle label. *Source* www.c2ccertified.org

There are totally 10 product categories under Cradle to Cradle certification and 21 products are being certified under the category "Fashion + Textiles". The products include fibre, yarn, fabric, thread and trims, dyes, and apparel.

8 Advantages and Disadvantages of Sustainability Standards

Many national and international organizations are involved in the development of standards, and mostly the certification is done by third-party organizations who are accredited by the organization that develops standards. The sustainability standards discussed above have both advantages and disadvantages.

Advantages are as follows:

1. Standards aid in minimizing the waste.
2. Standards lead towards sustainable development.
3. Standards help to increase productivity.
4. Standards ensure safety.
5. Standards facilitate in cutting down costs.
6. In the era of fast changing technology, standards make innovations easier.

Disadvantages are as follows:

1. There are many standards, and it may be complicated for the organization to choose a suitable standard.
2. Standards compel the organization to change their methods.
3. The implementation of standards results in some redundant actions that lead to loss in productivity.
4. It takes extra amounts of time, money, and paperwork for documentation and implementation of the standard.

9 Conclusion

Sustainability standards help industries to eliminate greenwashing, lower the investment risks in green innovations, and speed up the evolution to a sustainable future. They also help industries to save money by means of adopting more sustainable operational practices and business approaches. They facilitate industries to compete and sell their products in the international market. Any product with sustainability logo or mark has a special concern in the market. Since there are different ways or methods available for production, the ideal method may be chosen based on standards. Standards help the manufacturers to be in pace with the growing competition at the global level. Standards ensure that products are of good

quality and mitigate the costs of trial and error, and research and development. Above all, standards aid to minimize the negative impacts posed on the environment. Standards are essential for the globalized era.

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