Step 2 Sustainability

Online Course

UNIT 5
Environment Regulations and Standards

How to Implement Sustainable Manufacturing in Footwear
- New Occupational Profile and Training Opportunities -

Lifelong Learning Programme

Project number:
539823-LLP-1-2013-1-PT-LEONARDO-LMP

How to Implement Sustainable Manufacturing in Footwear - New Occupational Profile and Training Opportunities

Credits

Title
UNIT 5 - Environment Regulations and Standards

Coordination
CTCP Portugal

Layout and Editorial
Salto Alto CTCP criativo

Date
January 2016

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1. Introduction

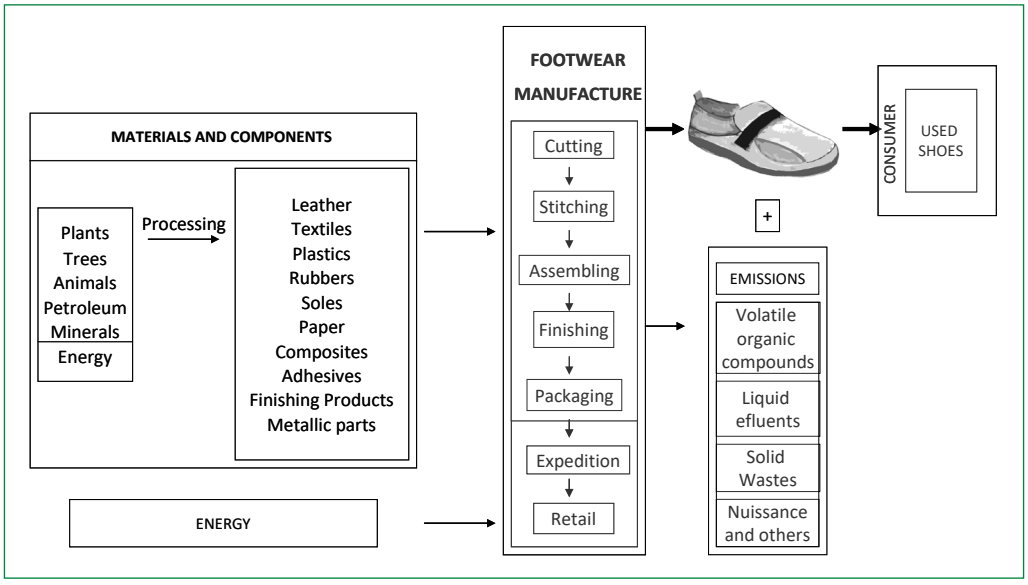
"Environment" in the modern context of sustainable development encompasses the physical and social factors of the surroundings of human beings and includes land, water, atmosphere, climate, sound, odour, taste, energy, waste management, coastal and marine pollution, the biological factors of animals and plants, as well as cultural values, historical sites, and monuments and aesthetics. Environment legislation can be generally defined as the body of laws that contains elements to control the human impact on the Earth and on public health and includes laws that specifically address environmental issues and also more general ones that have an impact on environment. In this module the European legal framework will be introduced and correlated with footwear manufacturing.

Footwear manufacturing involves the use of a large range of materials that are worked to the appropriate size and format by appropriate technological processes, thus resulting in a piece that can provide comfort, safety and pleasure to the consumer (Fig. 1). For simplicity, shoe may be divided in the upper and lower part. The first is actually made primarily of leather but, also, natural fibre textiles and man-made textiles. The second includes several components, the most relevant of them being the insock and insole made of leather, cellulose fibbers or composites; and the sole made of vulcanised rubber, thermoplastic rubber, thermoplastic polyurethane, expanded polyurethane or others. Other leather-goods manufacture involves the use primarily of leather, natural fibre textiles and man-made textiles. In these two industries, the materials are cut, processed to adequate shape and jointed mainly by stitching and bonding operations.

Leather and soles production involves specific processes in which hides, raw-materials, plastics, rubbers and others, are transformed to valuable materials and components.

The materials, components and final products obtained in these production processes are normally finished to enhance its aesthetics.

The sequential operations the materials, components and footwear products are subjected to, give added value to numerous resources but result also in volatile organic compounds (VOC), liquid effluents and solid wastes, among other minor emissions. In this module these aspects will be introduced in the context of the legal applicable framework and complemented with management options and best practices.



F1. Simplified footwear manufacture inventory

This Unit is structured in the following topics:

- **Environment legislation** – describes the evolution of the European environmental legislation, introduces the major European policies by area, and explains and promotes the use of legislative databases and search engines as critical tools to be up to date;
- **Emissions to the atmosphere** – includes volatile organic compounds and waste gases emissions evaluation and management;
- **Water consumption** – indicates the main sources of consumption and good practices;
- **Liquid effluents** – identifies the main liquid effluents generated and management options;
- **Wastes** – presents the main wastes generated in a typical footwear company, wastes management principles and implementation of management options;
- **Environmental noise** – introduces the main sources of noise emissions associated to footwear production, monitoring requirements, limits values and options for noise prevention and minimization;
- **Energy efficiency** – presents measures to promote energy efficient use in footwear industry;
- **Life cycle analysis, Greenhouse gases emissions, and Environment labels and declaration**s – describes principles and standards associated to these concepts;
- **Environmental Responsibility** – introduces the concept and associated legal framework.

2. Environmental legislation

Environmental legislation applicable to EU footwear manufacturers may be divided into two major categories namely, European and National. European is developed between sovereign States to develop regulations at the European level and provide obligations for States including regulating their behaviour in European relations in environmental related matters. National law on the other hand applies within a State and regulates the relations of citizens among each other and with the executive within the State. European law can find its application in national law when a State takes measures to implement its European obligations through enactment and enforcement of national legislation. This chapter focuses the main European legislation applicable to footwear manufacturing.

The European Union (EU) has its own legal system, whose main rules and principles are laid down in the founding Treaties. The EU can adopt legislative acts, which member countries must comply with and apply.

EU legal documents include:

- Treaties
- Legislation
- Consolidated legislation
- EFTA documents
- Preparatory acts
- EU case laws
- Parliamentary questions
- International agreements

2.1. Structure of European legislation

2.1.1. Development of European Environmental Law

The historic development of European environmental law can be separated into a number of phases.

The first phase

The first phase began with the entry into force of the original version of the European Economic Community Treaty on 1 January 1958 (Treaty of Rome) and continued up to 1972. This was the period during which the European institutions paid no specific attention to the development of an environment policy. Only incidentally were decisions taken which, in retrospect, could perhaps be regarded as environmental measures. For example, in 1967, Directive 67/548 relating to the classification, packaging and labelling of dangerous preparations, and, in 1970, Directive 70/157, relating to the permissible sound level and the exhaust system of motor vehicles. Although these were primarily measures taken with a view to the attainment of the common market, environmental considerations undoubtedly played a part.

Second phase

The European environment policy was initiated in 1972 when, during a European Council Summit meeting, it was declared that economic expansion, was not an end in itself, but a priority to help attenuate disparities in living conditions. It was thought that it must result in an improved quality of life. Also, special attention should be paid to non-material values and to the protection of the environment, so that progress could serve mankind. The European Council stressed the value of a European environment policy, therefore requested that the European institutions to draw up the First Environmental Action Programme.

In November 1973 this formalised plan was agrred and the Council of the European Communities and of the representatives of the Governments of the Member States stated "Whereas in particular, in accordance with Article 2 of the Treaty, the task of the European Economic Community is to promote throughout the Community a harmonious development of economic activities and a continuous and balanced expansion, which cannot be imagined in the absence of an effective campaign to combat pollution and nuisance or of an improvement in the quality of life and the protection of the environment".

This marked the beginning of the second phase, which lasted until the entry into force of the Single European Act on 1 July 1987.

The third phase

With the adoption of the Single European Act in 1987, environment was finally built in the European Economic Community (EEC) Treaty and became part of the legal competence of the European Community (now European Union).

The Objectives of the European Environmental Policy are set in the Article 191 of the Treaty of the Functioning of the European Union:

- Preserving, protecting and improving the quality of the environment
- Protecting human health
- Prudent and rational utilisation of natural resources
- Promoting measures at international level to deal with regional or worldwide environmental problems, and in particular combating climate change.

The fourth phase

The fourth phase of European environmental law started with the entry into force on 1 November 1993 of the Treaty on European Union (Maastricht Treaty). For the first time, the term 'environment' was actually referred to in the key Articles 2 and 3 of the EC Treaty, which set out the objectives and activities of the Community. Article 2 referred to "the promotion, throughout the Community, of a harmonious and balanced development of economic activities, sustainable and non-inflationary growth respecting the environment", while Article 3(k) stated that one of the activities for attaining this was "a policy in the sphere of the environment".

The formulation 'sustainable growth' was criticized as being a departure from the more usual formulation 'sustainable development'. From the point of view of environmental protection, the concept of 'sustainable growth' seemed marginally weaker than that of 'sustainable development'. Be that as it may, the incorporation of an environmental objective was certainly of great political significance.

The fourth phase is also distinct in that, for the first time, decisions under the Title on the Environment could be taken by a qualified majority. A further striking change as a result of 'Maastricht' was the status given to the action programmes on the environment. The increased competences of the European Parliament in the adoption of these programmes should also be noted. These programmes could be adopted under what is known as the co-decision procedure, which meant the European Parliament could exercise a veto.

The fifth phase

The fifth phase is the post-Amsterdam and post-Nice treaties. The Treaty of Amsterdam (1997) has introduced a number of interesting changes to the legal framework of European environmental policy. In the first place, the constitutional status of 'environmental protection' has been clarified. The text of Article 2 EC has been improved considerably. It now states that the Community shall have as its task promoting a harmonious, balanced and sustainable development of economic activities. This formulation is much more in line with European accepted practice in the environmental policy area.

The Amsterdam Treaty not only speaks of sustainable development, in Article 2 EC, it also introduced as a task to promote "a high level of protection and improvement of the quality of the environment". It is generally understood that within the objectives laid down in Article 2 EC, there is no hierarchy. A third improvement is the integration principle, Article 6 EC, according to which environmental protection requirements must be integrated into the definition and implementation of other Community policies, as a General Principle of EC law.

Sustainable development means the improvement of the standard of living and welfare of the relevant populations within the limits of the capacity of the ecosystems, by maintaining natural assets and their biological diversity for the benefit of present and future generations. In other words: to meet the needs of the present generation without compromising those of future generations.

The sustainable development strategy launched in 2001 by the Göteborg summit was composed of two main parts. The first proposed objectives and policy measures to tackle a number of key unsustainable trends, like combat climate change, ensure sustainable transport, address threats to public health, such as chemicals pollution, unsafe food and infectious diseases, manage natural resources more responsibly and stop biodiversity decline, combat poverty and social exclusion, and meet the challenge of an ageing population. The second part of the strategy called for a new approach to policy-making.

Concluding, protection of the environment is actually a well-established policy in the European Union starting in 1967 when the first environmental Directive for harmonised classification and the labelling of dangerous chemicals was adopted. Today, almost 50 years later and with an impressive body of environmental legislation in place, similar or identical concerns remain: environmental progress through technology has been outweighed by growing consumption and use of natural resource. Well known environmental problems of increasing natural resource use, loss of biodiversity, destruction of natural habitats and long-term pollution of most environmental media, continues to exist and require laws and dedicated joined efforts.

2.1.2. Horizontal legislation and EU environmental policy

Providing a substantive law for every specific environmental matter is difficult, therefore to have effective data instruments, which are able to regulate and to protect our environment, the EU decided to elaborate the so called "horizontal legislation".

The horizontal legislation covers many important areas, among them:

- Directive on Environmental Impact Assessment of proposed development projects (EIA Directive 2003/35/EC). This directive sets out the requirements for undertaking environmental assessments of environmental impacts of public and private projects which are likely to have a significant impact on the environment, before development consent is granted.
- Directive on Strategic Environmental Assessment of proposed plans and programs that sets out an obligation for public authorities to identify and assess the potential significant environmental effects of proposed plans and programs, including those of a transboundary nature.
- Public Access to Environmental Information and Public Participation and Access to Justice in environmental matters is guaranteed by the Aarhus Convention to which the EU is Party (implemented by the Directives 2003/4/EC, 2003/35 and the Regulation 1376/2006).
- Reporting Requirements for the harmonization of reports on the implementation of aproximately to 30 directives related to air, water and waste (Directive 91/692/EEC).
- The European Pollutant Release and Transfer Register covering the quantity and nature of 91 pollutants in the air, water and land. The register covers 27 EU Member States as well as Iceland, Liechtenstein, Norway, Serbia and Switzerland (Regulation 166/2006).
- Environmental Liability, for which the Directive 2004/35/EC establishes a framework with a view to preventing and remedying environmental damage.

2.1.3. Types of legally binding acts

The documents which form part of the legal European framework can be of different types depending on its purpose, including namely regulations, directives and decisions.

Regulations

About 10% of EU environmental laws take the form of regulations. Regulations are directly binding in Member States and supersede any conflicting national laws. Regulations come into force in the acceding countries on the date of accession.

Regulations usually have a precise purpose, and are used where it is important that in the Member States precisely the same requirements are applied. Nevertheless, environmental regulations require further national measures for implementation and therefore cannot be wholly ignored before accession. For example, the types of measures which countries will have to take include the appointment of competent authorities to inspect and control trade in severely restricted chemicals or in endangered species, the publication of guides and notification forms, or the designation of national sanctions for violations of the law.

Directives

Most EU environmental laws are directives. Directives are based on the principle of the approximation of laws. This is a form of law peculiar to the European Union. They are designed to impose obligations on Member States and to be sufficiently flexible to take into account differing legal and administrative traditions. The choice and method of aligning the national legal and administrative system is left to the discretion of the Member State.

Directives are binding on all Member States but may contain differing requirements which take into account the different environmental and economic conditions in each Member State. For example, the Large Combustion Plants Directive sets different targets for the reduction of emissions from each Member State, and even allows some which are economically less developed to increase their emissions.

Framework directives set out general principles, procedures, and requirements for legislation in different sectors. They have been adopted for example the air and waste sectors. In some aspects, such as waste and chemicals, EU law is a mixture of regulations and directives. It is important to analyse the impact of the regulations in order to know what actions will be necessary to approximate the linked directives.

Decisions

Decisions are individual legislative acts which are binding in their entirety upon the parties to whom they are addressed. They differ from regulations or directives in that they are usually very specific in nature. They are less common in the environmental field. Environmental regulations or directives often given the Commission the power to take decisions to implement them. For example, the Commission can amend the lists of wastes under the regulation on the transfrontier shipment of waste, specify forms and documentation requirements, and other administrative matters. Also, the Commission has taken a series of decisions setting conditions for the award of the EU eco-label to different product groups.

Table 1 summarizes the main specificities of these three forms of binding EU legislation.

Apart from these three legally binding acts, the Commission has developed a number of other documents to facilitate and manage their legislative work, including:

- Green and white papers - are produced by the Government and are consultative documents. White Papers contain future policy details on a subject before Parliament.
- Action Programmes - Environment Action Programmes provide a general policy framework for the European Union's environment policy in which the most important medium and long-term goals are defined and set out in a basic strategy, where appropriate including concrete measures.

- Guidelines - Non-mandatory specifications regarding current best environmental practices in management of air emissions, wastewater effluents, and solid waste.
- Communications - Environmental communication refers to the study and practice of how individuals, institutions, societies, and cultures craft, distribute, receive, understand, and use messages about the environment and human interactions with the environment. This includes a wide range of possible interactions, from interpersonal communication to virtual communities, participatory decision making, and environmental media coverage.
- Resolutions - a formal expression of opinion or intention made, usually after voting, by a formal organization, a legislature, a club, or other group.
- Declarations - declaration means a formal statement, proclamation, or announcement embodied in an instrument. For example, declaration of dividend, declaration of intention and declaration of trust. In international law, it refers to stipulations within a treaty according to which the parties agree to conduct their actions.

DIRECTIVES	REGULATIONS	DECISIONS
1. Enter into force upon the date specified in the directive or on the 20th day after publication in the Official Journal: this obliges Member States to approximate	1. Enter into force upon the date specified in the donument or on the 20th day after publication in the Official Journal	1. Enter into force upon notification to the party to whom they are addressed
2. Are the most frequently used of EU environmental law	2. Are used when a unified system is needed: funds; institutions; EU voluntary schemes such as eco-label; product or trade regulation (endangered species, transport of wastes)	2. Are used to specify detailed administrative requirements or update technical aspects of Regulations or Directives
3. Member States must adopt laws, regulations and procedures to give effect to the directive by the date of transposition; this is typically two years after the date of entry into force.	3. Member States must establish institutions and procedures; they should repeal conflicting national provisions	3. Are focused in scope and application
4. Come into effect on the date of practical application, the same as the date of transposition unless other date(s) is(are) indicated in the directive itself for specific actions. Some directives can have direct effect if the Member State fail to transpose into national legislation	4. Are directly binding on the date they come into force	4. Are binding on the parties to whom they are addressed on the date they come into force

By the end of 1992, European environmental law contained 196 Directives and 40 Regulations. Since then their number has slowly but steadily grown, even if today the Commission seems to be focussing more and more on the Framework Directives, which integrate the more specific pieces of legislation from the past.

As of today we can speak of about 300 or more which have been divided into NINE broad categories:

1. Horizontal (general) legislation
2. Air quality
3. Waste management
4. Water quality
5. Nature protection
6. Industrial pollution
7. Chemicals and Genetically Modifies Organisms (GMOs)
8. Climate change
9. Noise

2.1.4. Action Programmes

Action programmes set a vision and strategic approach and define goals and objectives to be achieved within a certain time frame. The European institutions have produced seven **action programmes on the environment** (EAPs) since 1973, their duration ranging from 3 to 10 years:

1st Environment Action Programme 1973-1976
2nd Environment Action Programme 1977-1981
3rd Environment Action Programme 1982-1986
4th Environment Action Programme 1987-1992
5th Environment Action Programme 1993-2000
6th Environment Action Programme 2002-2012
7th Environment Action Programme 2014-2020

The 7th Environment Action Programme will be guiding European environment policy until 2020. In order to give more long-term direction, it sets out a vision beyond that, of where it wants the Union to be by 2050:

"In 2050, we live well, within the planet's ecological limits. Our prosperity and healthy environment stem from an innovative, circular economy where nothing is wasted and where natural resources are managed sustainably, and biodiversity is protected, valued and restored in ways that enhance our society's resilience. Our low-carbon growth has long been decoupled from resource use, setting the pace for a safe and sustainable global society."

It identifies three key objectives:

- Protect, conserve and enhance the Union's natural capital
- Turn the Union into a resource-efficient, green, and competitive low-carbon economy
- Safeguard the Union's citizens from environment-related pressures and risks to health and wellbeing.

2.1.5. The European Environment Agency

At the beginning of May 1990, the Council adopted Regulation n. 1210/90 on the establishment of the European Environment Agency and the European Environment Information and Observation Network. It is the Agency's task to provide the EU and the Member States with objective, reliable and comparable information at the European level enabling them to take the measures necessary to protect the environment, to assess the results of such measures and to ensure that the public is properly informed about the state of the environment. The information in question is scientific and technical and regards the present and foreseeable state of the environment (quality, sensitivity, pressures).

The powers and duties of the Agency were defined when it was set up. It was decided not to give it powers of inspection of its own in the Member States. Its tasks have been kept limited, leaving open the possibility of deciding in future on further tasks for the Agency, in particular:

- Associating in the monitoring of the implementation of European environmental legislation
- Preparing environmental labels and criteria for the award of such labels to environmentally friendly products, technologies, goods, services and programmes which do not waste natural resources

- Promoting environmentally friendly technologies and processes and their use and transfer;
- Establishing criteria for assessing the impact on the environment with a view to application and possible revision of the EIA Directive.

Regulation n. 933/99 amending Regulation n. 1210/90 has broadened the scope of the Agency, albeit not spectacularly. The main effect of Regulation n. 1641/2003 has been to make Regulation n. 1049/2001, on access to environmental information, applicable to the Agency.

2.1.6. Main EU Directives per Environmental Area

The main directives governing the current framing of each of the environmental areas include.

Air quality

Air quality is one of the major concerns in the European Union. Therefore, the EU had a lot of legislative acts which regulate air pollution. With its Directive 2008/50/EC, the European Union merged the existing legislation into a single act. The EU's long-term objective is to achieve levels of air quality that do not result in unacceptable impacts on, and risks to, human health and the environment. Tackling pollution by particulate matter and ozone is a major priority of the Community's air quality policy. In addition, it addresses namely remaining problems relating to acidification, eutrophication and other problems of deposition generally, including the protection of cultural heritage.

Waste management

The main act providing a general legislative framework on waste management is the Directive 2008/98/EC, which institutes a new approach to waste management that focuses on limiting impacts on human health and the environment. It introduces a waste hierarchy that prioritizes the prevention of waste and requires Member States engagement through National Waste Prevention Programmes. The Directive extends producer responsibility for waste generation, stimulates recycling and recovery through the promotion of separate collection, and sets objectives for specific waste streams.

Other important legislative acts adopted so far include the Directive on Packaging and Packaging waste, on Landfill management, Incineration systems, among others.

However, serious gaps persist in the implementation of the EU waste laws due to a lack of priority in the Member States, a lack of reliable data and other impeding factors, which lead to great differences in the state and quality of implementation between Member States. The widespread use of inappropriate waste management technologies, such as landfills and other facilities that do not meet EU requirements, illegal waste shipments and other aspects of insufficient implementation create not only environmental damages, but also economic costs and harm to human health.

Water protection

The EU's Water Framework Directive provides opportunity to restore Europe's rivers, lakes and wetlands to ecological health by 2015 with each Member State committed to produce River Basin Management Plans by 2009. The general objective of this directive is to prevent and reduce pollution, to promote sustainable water usage, environmental protection, and to improve aquatic ecosystems and to mitigate the effects of floods and droughts.

Nature protection

To ensure biodiversity and the protection of the natural environment in the EU, an important piece of law had been produced, the Habitats Directive 92/43/EEC (on the conservation of natural habitats and of wild fauna and flora). It is defining a common framework for the conservation of wild plants and animals and habitats of Community interest.

The Habitats Directive established the "Natura 2000" network, the largest ecological network in the world. In practice, the Directive requires "Special Areas of Conservation" to be identified, classified and designated and a management plan to be drawn up for the conservation of natural habitats and for protection of species. The main aim of the Directive is to promote the maintenance of the biodiversity, taking into account social, economic, cultural and regional requirements.

Another important piece of legislation is the Birds Directive (2009/147/EC) which aims to protect all European wild birds and the habitats of listed species.

Industrial pollution control

Industrial activities play an important role in the economic well-being of Europe contributing to sustainable growth. However, these activities also have an impact on environment. Therefore, since early days of its environmental policy development, the EU also started to develop the legislation regarding the industrial pollution and its control. The Council Directive 96/61/EC on Integrated Pollution Prevention and Control (IPPC) from 1996 was in a heart of the environmental regulation of industrial activities in Europe. It introduced an integrated permitting procedures for 30 industrial sectors covering the pollution of water, soil and air and bases emission controls and applying a "best available technique" (BAT) concept.

One of the core elements at the European level are reference documents (BREFs) which are established to describe BATs and provide associated Emission Limit Values. That means that for pollutants for which "the need of Community action has been identified" the European Commission is mandated to propose EU wide obligatory emission limit value.

More recently adopted the Industrial Emission Directive (2010/75/EC) (IED) is the successor of the IPPC Directive and had to be transposed into national legislation by Member States by 7 January 2013.

Chemicals and Genetically Modified Organisms (GMOs)

The adoption of the Directive on the **classification, packaging and labeling of dangerous substances** (67/548/EEC) provided the first controls over the use of hazardous chemicals. It established a common system for the classification and labeling of such substances before they are marketed, and laid down procedures to be used to establish the hazards to human health and the environment of substances that might present a risk under conditions of normal usage. Under Directive 67/548/EEC (as amended) there are 15 classes of danger examples, among them "explosive", "very toxic", "carcinogenic" or "dangerous for the environment". The directive is continually updated to take account of scientific and technical progress in the field of dangerous substances.

REACH is the Regulation 1907/2006 on Registration, Evaluation, Authorization and Restriction of Chemicals. The aim of this Regulation is to ensure the protection of human health by the risk generated from a wrong use of chemicals. It aims to make industries responsible for assessing and managing the risk that can be posed by chemicals also ensuring the circulation of safety information to their users.

Compared to the legislation on chemical control, concern about the environmental **hazards of genetically modified organisms** (GMOs) is more recent. Initial concerns in the early 1970, when the potential of genetic engineering became apparent, were directed at potential risks to people, specifically laboratory staff dealing with GMOs in research and development. Given the importance of the potential hazards of the GMOs, the EU has developed a series of legislative acts in this area.

The Contained Use Directive 98/81/EC, amending Directive 90/219/EEC) covers the human health and environmental risks associated with applications of GMOs and specifically **genetically modified micro-organisms** (GMMs) in contained facilities. The directive covers only applications of GMMs that do not comprise any intentional release into the environment.

The Deliberate Release Directive 2001/18/EC amending Directive 90/220/EEC, covers the human health and environmental risks associated with the deliberate release into the environment of genetically modified organisms, defined as being any biological entity capable of replication or of transferring genetic material in which the genetic material has been altered in a way that does not occur naturally by mating and/or natural recombination. This Directive is based on the application of the precautionary principle concerning risk assessment and possible authorization for use of GMOs. It imposes different requirements for deliberate releases of GMOs for research and development purposes and releases for the placing on the market of products containing GMOs.

Climate change

At European level a comprehensive package of policy measures to reduce Greenhouse Gas Smissions (GGEs) has been initiated through the European Climate Change Programme (ECCP). Its goal is to identify and develop all the necessary elements of an EU strategy to implement the Kyoto Protocol and subsequente international agreements on this topic.

Various issues are strictly linked to the Climate Change challenge: the reduction of pollutants emissions, the use of renewable energy sources and the energy efficiency. All these aspects can effectively contribute to the reduction of the Climate Change impact on our lives and environment.

Specific legislation and standards has been produced in this field, namely addressing:

- Greenhouse Gas Monitoring and Reporting
- EU Emissions Trading System
- Effort Sharing Decision
- Carbon Capture and Storage
- Transport/Fuels
- Ozone Layer Protection
- Fluorinated Gases.

Noise

The Environmental Noise Directive 2002/49/EC aims to "define a common approach intended to avoid, prevent or reduce on a prioritized basis the harmful effects, including annoyance, due to the exposure to environmental noise". The actions promoted by the Directive are the same that characterize the other European Environmental Policy, such as: monitoring the environmental problems, informing and consulting the public, addressing local noise issues and developing a long term EU strategy. The Environmental Noise Directive applies to noise to which humans are exposed, particularly in built-up areas, in public parks or other quiet areas in an agglomeration, in quiet areas in open country, near schools, hospitals and other noise-sensitive buildings areas.

Overview

The EU environment legislation includes legislative acts under the following **eight broad** categories:

- **Horizontal:** environmental impact assessments, acess to information, strategic environmental assessment, public participation and environmental liability.
- **Air Quality:** ambient air, VOCs from petrol stations SO2, NOx, particulate and lead emissions; Sulphur content in fuel, vehicule emissions, emission trading, emission ceilings, ambient ozone.
- **Waste management:** hazardous waste, packaging waste, incineration of waste, disposal of vehicules, waste electronics disposal, hazardous substance.
- **Water Quality:** urban wastewater, drinking water, nitrates, bathing water, groundwater, dangerous substances to water, mercury, cadmium, HCH discharges, surface water abstraction, shellfish water, fish water.
- **Nature Protection:** habitats, wild birds, zoos.
- **Chemicals and GMOs:** dangerous substances, release of GMOs, Animal experiments, Asbestos, Biocides.
- **Climate Change:** EU Emissions Trading System, Carbon Capture and Storage, Transport/Fuels, Ozone Layer Protection and Fluorinated Gases.
- **Noise:** noise to which humans are exposed.

2.2. Legislative databases and search engines

This sub-chapter provides guidance on the application of the major data base and search engine to find sources of information and European legislation, the EUR-Lex.

To access to European law follow:
http://eur-lex.europa.eu/homepage.html?locale=pt

The EUR-Lex is available in **24 languages**. To access a specific language version, set the desired language by changing the language in the window that is in the header.

The EUR-Lex content is divided into sections: 1 - Treaties, 2 - International agreements, 3 - Legislation, 4 - Complementary legislation, 5 - Preparatory acts, 6 - Jurisprudence, 7 - National implementing measures, 8 - References to jurisprudence of national courts referring to EU law, 9 - parliamentary questions, 0 - consolidated legislation, C - Other documents published in the Official Journal C series, E - EFTA documents (Surveillance Authority, Standing Committee and the Court published in the Official Journal since 1994).

The Eur-Lex database includes the legislative acts and also information about the legislative processes for monitoring the lifecycle of a legal act, from the preparation of the proposal until its entry into force.

It is also possible to view relevant documents and specific information about each legislation, stage of the process, the decisions of each institution, the responsible services, among others.

Additionally, is feasible for example to search measures taken by Member States to transpose the European directives into national law. Following are presented some using guidelines.

1. Advanced search:

- Text in the title
- Year and CELEX number or transposed the directive
- Member State
- Celex number of national implementing measure

2. Quick search

- Look for the policy in question
- Note the respective CELEX number (for example, 31960L0201)
- Replace the first number by the number 7 (instead of 71960L0201 31960L0201)
- Add an asterisk at the end (71960L0201 *). If you want to search only measures of a Member State, add at the end of the three-letter code of the country and an asterisk (* 71960L0201FRA). The indication of the national implementing measures does not necessarily presuppose that these measures are complete and compliant. The national provisions are presented as reported by Member States.

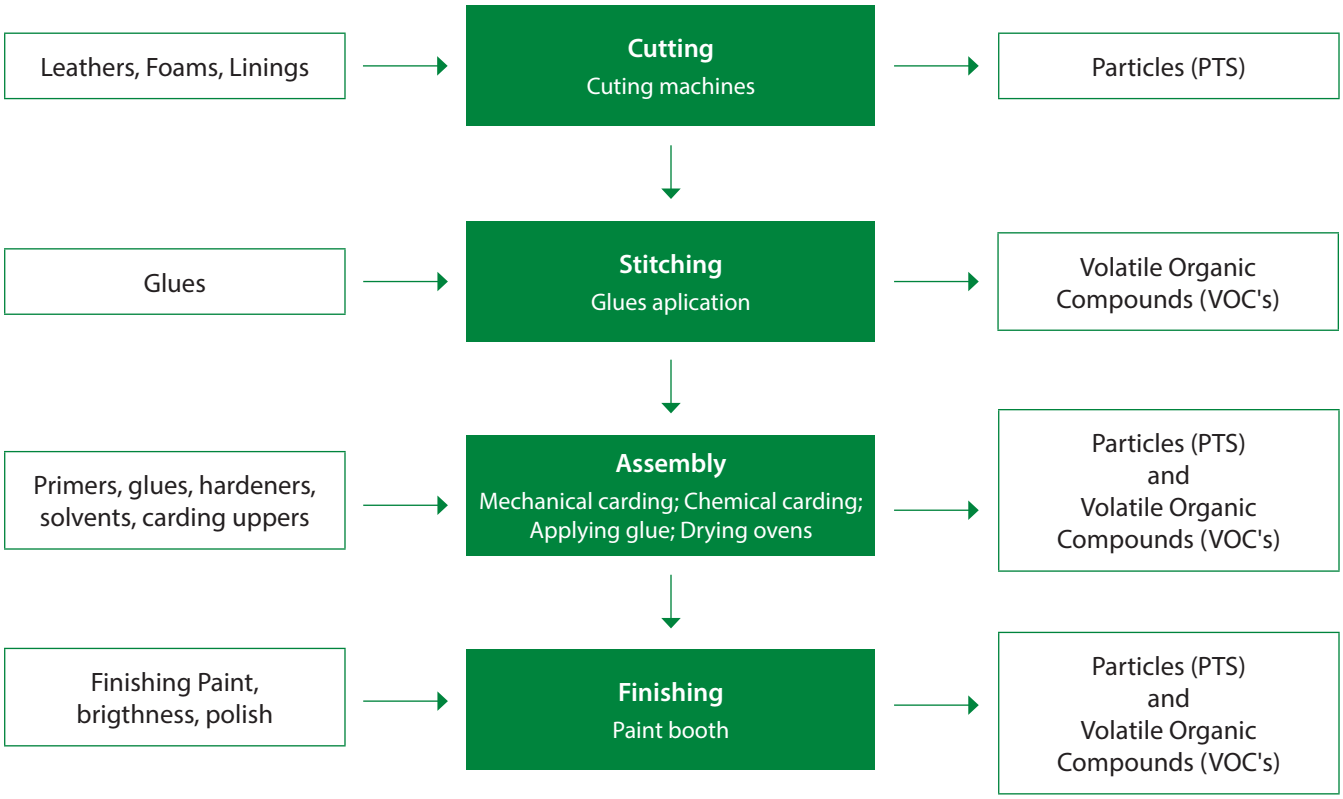
For further information, consult EUR-Lex and See in Annex 1 the EU actual main environmental legislation.

3. Emissions to the atmosphere

Footwear manufacturing involves the use of chemicals including primers, glues and paints. These products may contain volatile organic solvents commonly known in the industry as organic solvents or only solvents, that may cause atmospheric pollution. The solvents used include Ethyl acetate; Hexane; Methyl ethyl ketone, Toluene or Alcohols. Additionally, some operations may generate particles of leather or soles materials. Finally, if installed, heating devices based in combustion processes may also generate additional gaseous pollutants, namely, carbon, sulphur and nitrogen oxides.

These emissions may be done in waste gases through **stacks** or as **fugitive emissions**, when dispersed in the company internal environmental and them leaving by the windows and doors.

The following diagram shows the main materials and chemicals used in each production section and the potentially associated pollutants:



In the cutting section there may be minor emissions of particles. In the stitching section water-based and solvent-based adhesives may be used and the last type may result in emissions of volatile organic compounds. In the assembly and finishing sections, particles and volatile organic compounds may be emitted mainly in the following operations: chemicals application areas/systems, drying areas/ovens and roughing/carding/polishing machines.

This chapter covers: 3.1 Volatile organic solvents emitted per pair of complete footwear produced - total emission limit value evaluation and solvent management plan and 3.2 COV's, particles and other emissions waste gases through stacks.

3.1. Volatile organic solvents emitted per pair of complete footwear produced - total emission limit value evaluation and solvent management plan

3.1.1. Legal framework and concepts

The Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions brings together the Directive 2008/1/EC (integrated pollution prevention and control) and the following directives in a single directive of industrial emissions.

- Directive 2010/75/EU replaced definitively, the following directives, with effect from 7 January 2014:
- Directive 78/176/EEC on titanium dioxide industrial waste;
- Directive 82/883/EEC on the surveillance and monitoring of titanium dioxide waste;
- Directive 92/112/EEC on the reduction of titanium dioxide industrial waste;
- Directive 1999/13/EC on reducing emissions of volatile organic compounds (VOCs);
- Directive 2000/76/EC on waste incineration;
- Directive 2001/80/EC on the limitation of emissions of certain pollutants from large combustion plants; and
- Directive 2008/1/EC concerning integrated pollution prevention and control (IPPC) with effect from 1st January 2016.

The directive defines the obligations to be met by certain industrial activities, establishes a permit procedure and lays down requirements, in particular with regard to discharges. The objective is to avoid or minimise polluting emissions in the atmosphere, water and soil, as well as waste from industrial installations, with the aim of achieving a high level of environmental and health protection.

This directive covers industrial activities with a major pollution potential (defined in its Annex I) namely energy industries, production and processing of metals, mineral industry, chemical industry, waste management, rearing of animals.

Any industrial installation which carries out the activities listed in Annex I, to the Directive, must meet certain basic obligations, in particular:

- Preventive measures are taken against pollution
- The Best Available Techniques (BAT) are applied
- No significant pollution is caused
- Waste is reduced, recycled or disposed of in the manner which creates least pollution
- Energy efficiency is maximised
- Accidents are prevented and their impact limited
- Sites are remediated when the activities come to an end.

The directive requires the listed industrial sector installations use the Best Available Techniques (BAT) to achieve a high general level of protection of the environment as a whole, under economically and technically viable conditions.

The directive contains special provisions for the following installations:

- Combustion plants (≥ 50 MW)
- Waste incineration or co-incineration plants
- Certain installations and activities using organic solvents
- Installations producing titanium dioxide.

The directive does not apply to research activities, development activities or the testing of new products and processes.

The directive **requirements related to volatile organic compounds (VOC's) are applicable to footwear manufacturing.** Before introducing the legal obligations applicable to footwear some important concepts are herafter defined:

'existing installation' – installation in operation on 29 March 1999 or which was granted a permit or registered before 1 April 2001 or the operator of which submitted a complete application for a permit before 1 April 2001, provided that installation was put in operation no later than 1 April 2002;

'stack' – structure containing one or more flues providing a passage for waste gases in order to discharge them into the air;

'waste gases' – the final gaseous discharge containing volatile organic compounds or other pollutants from a stack or abatement equipment into air;

'fugitive emissions' – any emissions, not in waste gases, of volatile organic compounds into air, soil and water as well as solvents contained in any products;

'total emissions' – the sum of fugitive emissions and emissions in waste gases;

'preparation' – a mixture or solution composed of two or more substances

'adhesive' – any mixture, including all the organic solvents or mixtures containing organic solvents necessary for its proper application, which is used to adhere separate parts of a product;

'varnish' – transparent coating;

'consumption' – the total input of organic solvents into an installation per calendar year, or any other 12-month period, less any volatile organic compounds that are recovered for re-use;

'input' – the quantity of organic solvents and their quantity in mixtures used when carrying out an activity, including the solvents recycled inside and outside the installation, and which are counted every time they are used to carry out the activity;

're-use' – the use of organic solvents recovered from an installation for any technical or commercial purpose and including use as a fuel but excluding the final disposal of such recovered organic solvent as waste;

'contained conditions' – conditions under which an installation is operated so that the volatile organic compounds released from the activity are collected and discharged in a controlled way either via a stack or abatement equipment and are, therefore, not entirely fugitive.

3.1.2. Total solvents consumption preliminary estimation

In the footwear sector, volatile organic compounds (VOC's), commonly known in the industry as organic solvents or only solvents, are particularly associated with the use of the following products:

- Primers
- Solvent based glues
- Halogenating
- Paints and brightness.

The organic solvents typically found in such products include among others:

- Ethyl acetate
- n-Hexane
- Methyl ethyl ketone (2-butanone)
- Toluene
- Acetone.

The Directive 2010/75/EU imposes the total emission limit value (ELV) of 25 g solvent emitted per pair of complete footwear produced, when the annual consumption of organic solvents exceeds 5 tonnes per year.

Activity — Solvent consumption treshold in tonnes / year		Total Emission Limit Values		Specific provisions
		New Installations	Existing Installations	
14	Footwear manufacturing **(>5 Ton)**	**25 g per pair**		The limit values for total emissions are expressed in grams of solvent emitted per pair of **completed footwear** produced

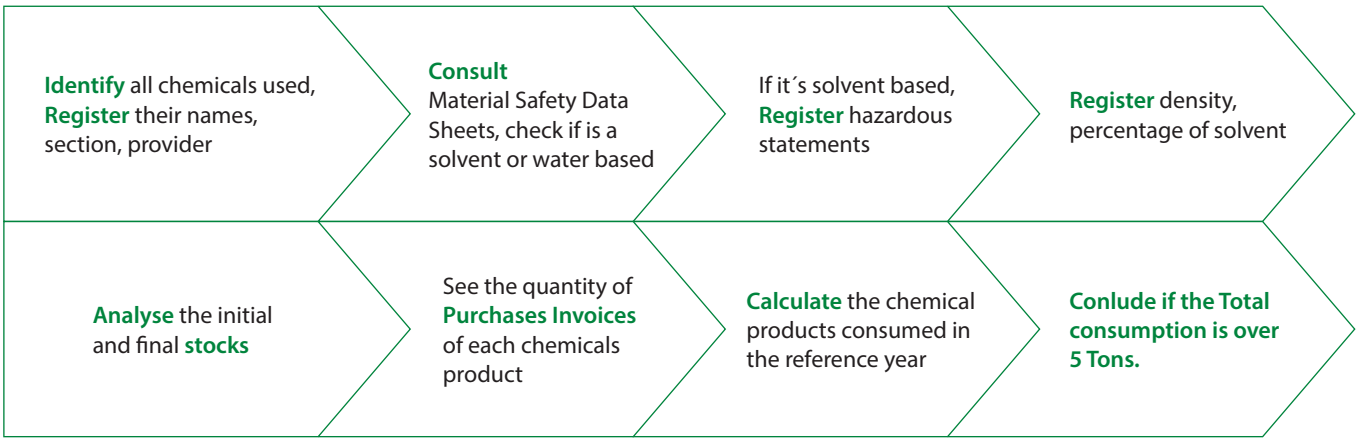
It is found that the consumption of solvent/pair is dependent on the number of pairs produced and the manufacturing process used. Thus, it is necessary that footwear companies account all the solvents consumed during the year to be aware whether or not are covered by this legislation.

The information recommended to perform a preliminary determination of the solvent consumption includes the following:

- Names of products containing volatile organic solvents
- In what section are used and in what operation
- Material Safety Data Sheets (MSDS) of chemical products used to obtain namely the percentage of solvent in the product
- Purchases invoices of chemicals products
- Initial and final stock of chemicals in the fiscal year.

The MSDS of the chemical products indicates if it is organic solvent or water based. If solvents are present, register their percentage in weight by weight, the density of the product, relevant hazardous statements and all the solvents identified. Then calculate the products consumed in the reference year, by analysing the initial, final stocks and the invoices.

The following figure shows step by step how to estimate the total solvent consumption, the company will be covered by Directive 2010/75/EU if the amount exceeds 5 tons per year. To preliminarily verify compliance with the emission limit value (ELV) per pair, divide the total amount of solvent consumption (in grams) by the total number of pairs produced.



3.1.3. Solvent management plan and emissions control

The solvent management plan, shall be used, to **verify in detail the compliance with the legal limit value and identify future reduction options.** This plan will also, provide information to the public on solvent consumption, solvent emissions and compliance with the legal requirements.

The following definitions provide a framework for the evaluation and mass balance exercise.

Inputs of organic solvents (I):

I1 – the quantity of organic solvents or their quantity in mixtures purchased which are used as input into the process in the time frame over which the mass balance is being calculated.

I2 – The quantity of organic solvents or their quantity in mixtures recovered and reused as solvent input into the process. The recycled solvent is counted every time it is used to carry out the activity.

Outputs of organic solvents (O):

O1 – Emissions in waste gases.

O2 – Organic solvents lost in water, taking into account waste water treatment when calculating O5.

O3 – The quantity of organic solvents which remains as contamination or residue in products output from the process.

O4 – Uncaptured emissions of organic solvents into air. This includes the general ventilation of rooms, where air is released to the outside environment via windows, doors, vents and similar openings.

O5 – Organic solvents and/or organic compounds lost due to chemical or physical reactions (including those which are destroyed, by incineration or other waste gas or waste water treatments, or captured, as long as they are not counted under O6, O7 or O8).

O6 – Organic solvents contained in collected waste.

O7 – Organic solvents, or organic solvents contained in mixtures, which are sold or are intended to be sold as a commercially valuable product.

O8 – Organic solvents contained in mixtures recovered for reuse but not as input into the process, as long as not counted under O7.

O9 – Organic solvents released in other ways.

The consumption (C) is calculated according to the following equation:

C = I1 – O8

A parallel exercise shall also be undertaken to determine solids used in coating in order to derive the annual reference emission and the target emission each year.

For assessing compliance with a total emission limit value expressed in solvent emissions per unit product, the solvent management plan shall be drawn up annually to determine the emissions (E).

The emissions are calculated according to the following equation:

E = F + O1

Where F is the fugitive emission. The emission figure shall then be divided by the relevant product parameter.

The fugitive emission is calculated according to one of the following equations:

F = I1 – O1 – O5 – O6 – O7 – O8
or
F = O2 + O3 + O4 + O9

F is determined either by direct measurement of the quantities or by an equivalent method or calculation, for instance by using the capture efficiency of the process.

The fugitive emission limit value is expressed as a proportion of the input, which shall be calculated according to the following equation:

I = I1 + I2

Determination of fugitive emissions is done by a short but comprehensive set of measurements and needs not be done again until the equipment is modified.

Other requirements to be taken into account include:

- The emissions of the volatile organic compounds, substances or mixtures where the mass flow of the sum of the compounds causing the labelling is greater than, or equal to, 10 g/h, an emission limit value of 2 mg/Nm3 shall be complied with. The emission limit value refers to the mass sum of the individual compounds.
- For emissions of halogenated volatile organic compounds which are assigned or need to carry the hazard statements H341 or H351, where the mass flow of the sum of the compounds causing the hazards statements H341 or H351 is greater than, or equal to, 10 g/h, an emission limit value of 2 mg/Nm3 shall be complied with. The emission limit value refers to the mass sum of the individual compounds.
- Channels to which abatement equipment is connected, and which at the final point of discharge emit more than an average of 10 kg/h of total organic carbon, shall be monitored continuously for compliance.
- In the other cases, Member States shall ensure that either continuous or periodic measurements are carried out. For periodic measurements at least three measurement values shall be obtained during each measurement exercise.
- Measurements are not required in the case where end-of-pipe abatement equipment is not needed to comply with this Directive.

If the **footwear company exceeds 25 grams/pair**, needs to prepare a solvent consumption reduction plan, with measures to be implemented in order to reduce solvent consumption per pair of footwear produced. This information, must be submitted for approval, to the competent authority of the Member State.

The solvent consumption reduction, may include several measures such as, the elimination of solvent based products especially in the sewing and finishing sections and the use of solid or water-based products in the assembling operations.

To reduce solvent consumption, the footwear companies could also acquire soles already treated cleaned and finished leathers.

It is also important to give the adequate information and traning to the personnel and to replace products that contain substances or mixtures classified as carcinogens, mutagens, or toxic to reproduction, as far as possible, by less harmful substances. The hazards statements shall be consulted in material data sheets.

3.2. COV's, particles and other emissions waste gases through stacks

3.2.1. Legal framework and application to footwear companies

An additional EU legal framework applicable to the footwear industry, refers to, the emissions of waste gases through stacks.

Waste gases in footwear sector, may include volatile organic compounds and particles, associated to the manufacturing processes and also carbon dioxide, carbon monoxide, nitrogen, sulphur and oxides, among others, associated namely to combustion in heating boilers of installations.

The European legislation, sets a complete framework, aiming the definition of standardized procedures to evaluate and control these emissions. The Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 regarding ambient air quality and cleaner air for Europe entered into force on 11 June 2008. This Directive merges the majority of existing legislation into a single directive with no change to air quality objectives (except for the fourth daughter directive):

1. Council Directive 96/62/EC on ambient air quality assessment and management is commonly referred to as the Air Quality Framework Directive. It describes the basic principles as to how air quality should be assessed and managed in the Member States. It lists the pollutants for which air quality standards and objectives.

2. Council Directive 1999/30/EC relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air. The directive was is the so-called "First Daughter Directive". The directive describes the numerical limits and thresholds required to assess and manage air quality for the pollutants mentioned. It addresses both PM10 and PM2.5 but only establishes monitoring requirements for fine particles.

3. Directive 2000/69/EC of the European Parliament and of the Council relating to limit values for benzene and carbon monoxide in ambient air. This was the Second Daughter Directive and established the numerical criteria relating to the assessment and management of benzene and carbon monoxide in air.

4. Directive 2002/3/EC of the European Parliament and of the Council relating to ozone in ambient air. This was the Third Daughter Directive and established target values and long term objectives for the concentration of ozone in air. Ozone is a secondary pollutant formed in the atmosphere by the chemical reaction of hydrocarbons and nitrogen oxides ion the presence of sunlight. As such the directive also describes certain monitoring requirements relating to volatile organic compounds and nitrogen oxides in air.

5. Directive 2004/107/EC of the European Parliament and of the Council relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air. This is the Fourth Daughter Directive and completes the list of pollutants initially described in the Framework Directive. Target values for all pollutants except mercury are defined for the listed substances, though for PAHs, the target is defined in terms of concentration of benzopyrene which is used as a marker substance for PAHs generally. Only monitoring requirements are specified for mercury.

6. Council Decision 97/101/EC establishing a reciprocal exchange of information and data from networks and individual stations measuring ambient air pollution within the Member States. This "EoI Decision" describes the procedures for the dissemination of air quality monitoring information by the Member States to the Commission and to the public.

7. Commission Decision 2004/461/EC laying down a questionnaire for annual reporting on ambient air quality assessment under Council Directives 96/62/EC and 1999/30/EC and under Directives 2000/69/EC and 2002/3/EC of the European Parliament and of the Council. This decision specifies the format and content of Member States' Annual Report on ambient air quality in their territories. New air quality objectives for fine particles, witch are particles less than 2,5 micrometers in diameter (also known as PM2,5), including the limit value and exposure related objetives – exposure concentration obligation and exposure reduction target.

The possibility to discount natural sources of pollution when assessing compliance against limit values.

The possibility for time extensions of three years for respirable suspended particle, which are particles with a diameter of 10 micrometres or less (also known as PM10), or up to five years (NO2, benzene) for complying with limit values, based on conditions and the assessment by the European Commission.

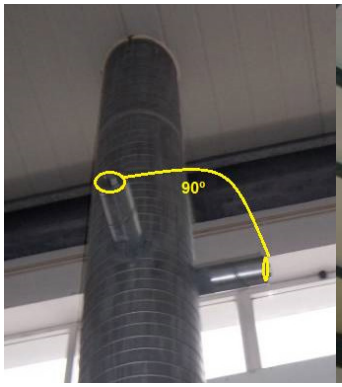
These European Union directives, establish only general targets regarding the concentration of certain substances. Each Member State must set limits for each substance, according to their actual pollution situation, climate, among others. The table here after presented, shows a general overview of potential pollutants relevant fot footwear manufacturing and limits values applicable in Portugal.

POLLUTANT	minimum thershold (kg/h)	maximum thershold (kg/h)
Sulfur dioxide (SO_2)	2	50
Nitrous oxide (NO_x) (expressed as (NO_2)	2	30
Total particles in suspension	0,5	5
Volatile organic compounds (COV) | (expressed as total carbon)	2	30
Chlorinated volatile inorganic compounds (expressed in Cl^-)	0,3	3
Carbon monoxide (CO)	5	100

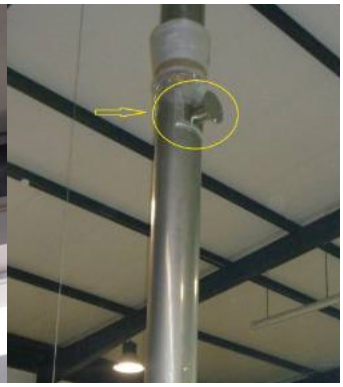
Before the monitoring the pollutants, the stacks must be in accordance with the applicable constructive recommendations, namely: circular section, suitable height and absence of hats or other similar devices on top restricting the good dispersion to the atmosphere (as presented in the following figure).

Example of stacks with obstructive device

Additionally, flanges should be installed to allow correct sampling. In Portugal, for example, stacks with a diameter equal to or greater than 35 centimetres (or 13,8 inches) need two flanges placed on the same plane making an angle of 90 degrees, stacks with a diameter lower than 35 centimetres (13,8 inches) require only one flange, as presented in the following figures.

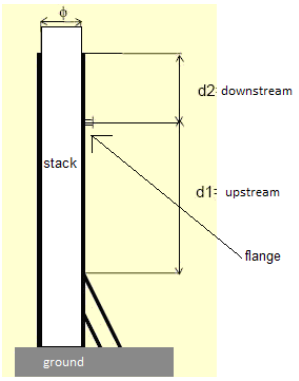


Stack with diameter ≥35 cm, 2 flanges



Stack with diameter < 35 cm, 1 flange

In addition, it is also necessary to take into account the height at flanges need to be fixed. In Portugal, for example, flanges must be fixed at 5 times the diameter of the stack, downstream and upstream. When this is not possible, the flange should be installed downstream, in the height of 0.5 times the diameter of the stack and 2 times the diameter, upstream. The following table briefly shows the heights at which the flanges should be installed in stacks.



Distances	Portuguese standard NP 2167 (priority)	Standard EPA 1 (unable to fulfill the Portuguese standard)
d2 (downstream above the flange)	5x diameter	½ x the diameter of the stack
d1 (upstream / below the flange)	5x diameter - the last disturbance is the top of the stack 2x the diameter of the stack - the last disturbance is a side outlet / elbow).	2x the diameter of the stack

Finally, to perform the emissions evaluation and monitoring in the stacks, the technicians must be at the level of the flanges, and so, is necessary to provide safe and stable platforms, scaffolding or a crane. The following images present some of the possible options.

Fixed platforms

Crane

Scaffolding

The monitoring of the emissions into the atmosphere should be carried out with the installation working in normal representative conditions.

Periodic monitoring of pollutants, should be carried out by an accredited external laboratory, with the periodicity defined by each Member State (for example, in Portugal is twice a year with a minimum interval of two months between measurements).

Emission Limit Values are considered respected if none of the results of the measurements or specific defined sums, exceed the respective emission limit values. The table following presented, shows a general overview of potential pollutants and limits values applicable in Portugal. In Portugal, the results of this monitoring must be sent to the due competent authority.

POLLUTANT	minimum thershold (kg/h)	maximum thershold (kg/h)
Sulfur dioxide (SO_2)	2	50
Nitrous oxide (NO_x) (expressed as (NO_2)	2	30
Total particles in suspension	0,5	5
Volatile organic compounds (COV) | (expressed as total carbon)	2	30
Chlorinated volatile inorganic compounds (expressed in Cl^-)	0,3	3
Carbon monoxide (CO)	5	100

3.3.2. Emissions of air pollutants – Control waste gases

When the values of pollutants exceed the limit established by the Member State, preventive and corrective action measures should be taken. The following table presents control measures applicable to footwear manufacturing. To reduce the emissions of volatile organic compounds, minimize the use of products emitting the VOCs. If additional measures are required appropriate filters may be installed and need to be correctly maintained.

SECTION	POLLUTANT EMITTED BY THE CHIMNEY	NOTE
Cutting	Particles	Not expected to exceed the threshold value
Stitching Assembly	Volatile organic compounds and Particles	Improve ventilation system Adsorption Systems - Charcoal filters with a saturation sensing device Vacuum system with cyclone or Suction system with bag filters
Finishing	Volatile organic compounds particles	Adjusting the opening and the spray gun pressure to decrease the amount of product released into the cabin (and reduces waste) Filters

4. Water consumption

Water consumption in the establishments of footwear production occurs primarily in the following situations:

- Finishing / painting cabin with water curtain
- Cooling systems / equipments
- Toilets and changing rooms
- Cantin, drinking bowls, cafeteria
- Cleaning and washing operations
- Irrigation of green spaces.

In the footwear manufacturing water supply for human consumption can be done contrating public or private entities/companies or using own water resources such as wells or boreholes. In any case, the minimum limit values set by the EU have to be fulfilled or, if applicable, stricter minimum values set in each of the Member States.

In this chapter are presented in paragraph 4.1 the requirements recommended by European legislation and control procedures as well. The 4.2 presents some Good practices.

4.1. Human consumption and management

Due to its relevance, this chapter will focus primarily on the requirements applicable to water for human consumption and management procedures to ensure compliance with European Union water quality requirements.

The Directive that aims to protect human health by laying down healthiness and purity requirements is Council Directive 98/83/EC of the 3rd November 1998.

According to this Directive Member States shall ensure that the water for human consumption:

- Does not contain any concentration of micro-organisms, parasites or any other substance which constitutes a potential human health risk.
- Meets the minimum requirements (microbiological and chemical parameters and those relating to radioactivity) laid down by this Directive.

It is understood by **water intended for human consumption** all water either in its original state or after treatment, intended for drinking, cooking, food preparation or other domestic purposes, regardless of its origin and whether it is being supplied from a distribution network, a truck or tanker, in bottles or containers.

Are part of the **distribution system,** plumbing, fixtures and appliances installed between the taps that are normally used for human consumption and the distribution network but only if these plumbing, fittings and appliances are not the responsibility of the water supplier, in its quality water supplier, according to the applicable national law.

The parameter values established will be respected in the case of water supplied from a distribution network, at the point, within premises where water emerges from the taps normally used for human consumption.

The Directive requires Member States to monitor regularly the quality of water intended for human consumption by using the methods of analysis specified in the Directive, or equivalent methods. For this purpose, sampling points and monitoring programmes need to be established.

Member States shall take all necessary measures to ensure the realization of regular monitoring of water quality for human consumption in order to check whether the water available to consumers meets the requirements of this Directive. If the companies acquire water to public or private entities these must evaluate and make sure provide water that meet the criteria. The company is responsible to guarantee that the internal distribution network, taps, among others, ensure hygienic providing to the workers. In the case the companies use their own water resources such as wells or boreholes, are responsible also for respecting extraction requirements set by the Member State and the quality of the water extracted.

The defined parametric values need to be respected,
namely (Annex I of the Directive):

PARAMETERS AND PARAMETRIC VALUES

PART A

Microbiological parameters

Parameter	Parametric value (number/100 ml)
Escherichia coli (E. coli)	0
Enterococci	0

The following applies to water offered for sale in bottles or containers:

Parameter	Parametric value
Escherichia coli (E. coli)	0/250 ml
Enterococci	0/250 ml
Pseudomonas aeruginosa	0/250 ml
Colony count 22 °C	100/ml
Colony count 37 °C	20/ml

PART B

Chemical parameters

Parameter	Parametric value	Unit	Notes
Acrylamide	0,10	µg/l	Note 1
Antimony	5,0	µg/l	
Arsenic	10	µg/l	
Benzene	1,0	µg/l	
Benzo(a)pyrene	0,010	µg/l	
Boron	1,0	mg/l	
Bromate	10	µg/l	Note 2
Cadmium	5,0	µg/l	
Chromium	50	µg/l	
Copper	2,0	mg/l	Note 3
Cyanide	50	µg/l	
1,2-dichloroethane	3,0	µg/l	
Epichlorohydrin	0,10	µg/l	Note 1
Fluoride	1,5	mg/l	
Lead	10	µg/l	Notes 3 and 4
Mercury	1,0	µg/l	
Nickel	20	µg/l	Note 3
Nitrate	50	mg/l	Note 5
Nitrite	0,50	mg/l	Note 5
Pesticides	0,10	µg/l	Notes 6 and 7
Pesticides — Total	0,50	µg/l	Notes 6 and 8
Polycyclic aromatic hydrocarbons	0,10	µg/l	Sum of concentrations of specified compounds; Note 9
Selenium	10	µg/l	
Tetrachloroethene and Trichloroethene	10	µg/l	Sum of concentrations of specified parameters
Trihalomethanes — Total	100	µg/l	Sum of concentrations of specified compounds; Note 10
Vinyl chloride	0,50	µg/l	Note 1

Note 1: The parametric value refers to the residual monomer concentration in the water as calculated according to specifications of the maximum release from the corresponding polymer in contact with the water.

Note 2: Where possible, without compromising disinfection, Member States should strive for a lower value.

For the water referred to in Article 6(1)(a), (b) and (d), the value must be met, at the latest, 10 calendar years after the entry into force of the Directive. The parametric value for bromate from five years after the entry into force of this Directive until 10 years after its entry into force is 25 µg/l.

Note 3: The value applies to a sample of water intended for human consumption obtained by an adequate sampling method (1) at the tap and taken so as to be representative of a weekly average value ingested by consumers. Where appropriate the sampling and monitoring methods must be applied in a harmonised fashion to be drawn up in accordance with Article 7(4). Member States must take account of the occurrence of peak levels that may cause adverse effects on human health.

Note 4: For water referred to in Article 6(1)(a), (b) and (d), the value must be met, at the latest, 15 calendar years after the entry into force of this Directive. The parametric value for lead from five years after the entry into force of this Directive until 15 years after its entry into force is 25 µg/l.

Member States must ensure that all appropriate measures are taken to reduce the concentration of lead in water intended for human consumption as much as possible during the period needed to achieve compliance with the parametric value.

When implementing the measures to achieve compliance with that value Member States must progressively give priority where lead concentrations in water intended for human consumption are highest.

Note 5: Member States must ensure that the condition that [nitrate]/50 + [nitrite]/3 ≤ 1, the square brackets signifying the concentrations in mg/l for nitrate (NO_3) and nitrite (NO_2), is complied with and that the value of 0,10 mg/l for nitrites is complied with ex water treatment works.

Note 6: 'Pesticides' means:

- organic insecticides,
- organic herbicides,
- organic fungicides,
- organic nematocides,
- organic acaricides,
- organic algicides,
- organic rodenticides
- organic slimicides,
- related products (*inter alia*, growth regulators)

and their relevant metabolites, degradation and reaction products.

Only those pesticides which are likely to be present in a given supply need be monitored.

Note 7: The parametric value applies to each individual pesticide. In the case of aldrin, dieldrin, heptachlor and heptachlor epoxide the parametric value is 0,030 µg/l.

Note 8: 'Pesticides — Total' means the sum of all individual pesticides detected and quantified in the monitoring procedure.

Note 9: The specified compounds are:

- benzo(b)fluoranthene,
- benzo(k)fluoranthene,
- benzo(ghi)perylene,
- indeno(1,2,3-cd)pyrene.

Note 10: Where possible, without compromising disinfection, Member States should strive for a lower value.

The specified compounds are: chloroform, bromoform, dibromochloromethane, bromodichloromethane.

For the water referred to in Article 6(1)(a), (b) and (d), the value must be met, at the latest, 10 calendar years after the entry into force of this Directive. The parametric value for total THMs from five years after the entry into force of this Directive until 10 years after its entry into force is 150 µg/l.

Regarding monitoring the following parameters will be subject to routine checks. Member States may add other parameters to this list if they deem it necessary.

MONITORING

TABLE A

Parameters to be analysed

Aluminium (Note 1)
Ammonium
Colour
Conductivity
Clostridium perfringens (including spores) (Note 2)
Escherichia coli (E. coli)
Hydrogen ion concentration
Iron (Note 1)
Nitrite (Note 3)
Odour
Pseudomonas aeruginosa (Note 4)
Taste
Colony count 22 °C and 37 °C (Note 4)
Coliform bacteria
Turbidity

Note 1: Necessary only when used as flocculant (*).

Note 2: Necessary only if the water originates from or is influenced by surface water (*).

Note 3: Necessary only when chloramination is used as a disinfectant (*).

Note 4: Necessary only in the case of water offered for sale in bottles or containers.

(*) In all other cases, the parameters are in the list for audit monitoring.

When the parametric values are not attained, the company/provider/Member States shall ensure that the corrective action needed is taken as quickly as possible in order to restore water quality.

Regardless of compliance, or otherwise, with the parametric values, Member States shall prohibit the distribution of drinking water or shall restrict its use and shall take any action needed where that water constitutes a potential human health hazard. Consumers shall be informed of any such action and properly advised.

For non-compliance with the parametric values or with the specifications of Part C of Annex I, Member States shall consider whether that non-compliance poses a risk to human health and take appropriate corrective measures to restore water quality when the protection of human health requires.

Footwear companies shall perform initial analysis and rotine checks to ensure the quality of the water provided to the workers. Some sources of problems include:

- Age and the condition of the plumbing and hidropressores of the building (if any. It is essential to ensure the maintenance and cleaning of all equipment in contact with water. The use of reservoirs is inadvisable as it can be the source of microbiological contamination.
- Water with a yellowish appearance. This may be associated with the presence of iron in water due to corrosion of the tubes resulting in rusting and bad taste. The appropriate solution is replacing sewer pipes.

4.2. Sustainable practices

Water management sustainable practices may include, namely:

- Ensure awareness of employees for the rational use of water through information and training;
- Use equipment to reduce water consumption, as taps with reduced flow, pressure taps, toilets with controlled discharges and automatic systems to open and close water taps;
- Keep in good repair the equipment and internal water network facilities (taps and plumbing) to mantain water quality and prevent water leaks (2 mm will waste 3200 liters of water per day);
- Do not dispose harmful products such as oils, paints, toxic or corrosive products in the environment or wastewater sewage;
- Avoid watering gardens in the hottest time of day (there are more evaporative water loss) and invest in efficient irrigation equipments (dropwise, sprinkler);
- Reserve rainwater for example for general cleaning operations and watering;
- Promote the necessary paving outdoor, leaving landscaped areas to allow rainwater to infiltrate the earth soil.

5. Water protection and liquid effluents discharge

The Directive 2000/60/CE of the European Parliament and of the Council of 23 October 2000 is the main instrument of EU policy on water protection. This Directve establishes a framework for Community action for the protection of water interior surface, transitional waters, coastal waters and groundwater.

5.1. Main effluents generated and management options

Depending on their origin, the footwear sector produces essentially two types of wastewater:

- **Domestic wastewater:** waste water from residential settlements and services which originates predominantly from the human metabolism and from household similar activities.
- **Industrial wastewater:** any waste water from plants used for all kinds of trade or industry, other than domestic origin or storm water runoff.

The domestic wastewaters in a footwear company are generated mainly in the sanitary facilities, cafeterias, canteen, bar, social areas and general washing of these facilities and outdoor spaces.

Industrial wastewaters may be generated namely in the footwear spraying cabins with water curtain, hydro filter systems connected to the carding machine and other systems and its cleaning. These effluents can not be mixed with domestic wastewater.

The management of all the effluents shall be performed in a controlled manner.

The domestic effluents may be discharged on the network of municipal or industrial collectors. In this option the company must follow the guidelines of the managing body of the network.

If these options are not available footwear companies may also discharge the domestic effluents in closed tanks/containers. When the tank is full, the wastewater is sucked into a cistern, transported and then subjected to appropriate treatment, by duly authorized operators.

In some regions, domestic effluents can still be discharged into a septic tank with a soil infiltration box. When this happens a permit from the competent authority is usually required and the company must ensure that complies with the emission limits established by the respective Member State.

Industrial effluents proper management and treatment include, discharge in an industrial collector or storage in containers for a specific limited time, both followed by adequate transportation by authorised entity and treatment in a dully authorised facility. In general, the quantity of industrial liquid effluents generated by the footwear companies is small and don´t justifies the existence of own wastewater treatment facilities.

The methods used to monitor the parameters of effluent for discharge or treatment must comply with the national or European standards adopted by each Member State, aiming to provide protection of the environment and public health.

5.2. Emission limit values and discharge media

The discharge in municipal or industrial collectors as well in the environment is severely regulated in the EU Member States and the emission limit values to be respected depend on the media (industrial collector, soil, river, sea, among other). Footwear companies must obtain the necessary permits/authorizations and comply with the emission limit values defined for each parameter, in each Member State, region, municipality or treatment facility. The following table presents an example of the requirements set by a Portuguese municipality.

Parameters	Emission Limit Value	Units
Ph	6,0-9,0	Sorensen scale
Temperature	60	ºC
Division Biochemical oxygen deficiency by Chemical Oxygen deficiency (CBO_5/CQO)	not less than 0,25	mg/l O_2
Chemical Oxygen deficiency (CQO)	1600	mg/l O_2
Total suspended solids	500	mg/l
Total Arsenic	1,0	mg/l As
Hexavalent chromium	0,1	mg Cr VI/l
Total Chromium	2,0	mg Cr /l
Total Lead	1,0	mg Pb/l
Total cadmium	0,2	mg Cd/l
Total Copper	1,0	mg Cu/l
Total Nickel	2,0	mg Ni/l

Portuguese example of emission limit values for discharge in a municipal collector

The Portuguese discharge limit values in water lines (rivers / streams) are presented in the next table.

Parameters	Emission Limit Value	Units
Ph	6,0-9,0	Sorensen scale
Temperature	increase of 3ºC	ºC
CBO_5	40	mg/l O_2
CQO	150	mg/l O_2
SST	60	mg/l
Aluminum	10	mg/l Al
Total Manganese	2,0	mg/l Mn
Smell	not detectable in the dilution of 1:20	---
Colour	not visible in the dilution of 1:20	-----
Phenols	0,5	mg/l C_6H_5OH
Free Chlorine	0,5	mg/l Cl_2
Total Chlorine	1,0	mg/l Cl_2

Portuguese example of emission limit values for discharge of wastewater in water lines

The next table shows the ranges obtained in various chemical analysis of wastewaters from several spray booth cabins. The highest values correspond to effluents with more days of use and greater storage periods.

Parameter	Range	Parameter	Range
Turbidity (NTU)	30-220	Hardness ($mgCaCO_3/L$)	14-443
pH	4,34-6,74	chlorides (mg Cl/L)	21-2130
O2 (mg/l)	<1,0-4,4	free residual chlorine (mg Cl_2/l)	<0,20 - <5,0
TS (mg/l)	490-17600	total residual chlorine (mg Cl_2/l)	<0,05 - <5,0
TSS (mg/l)	60-13140	S^{2-} (mg/l)	< 0,5
TDS (mg/l)	430-4460	N (mg/l)	<1,0-10
VDS (mg/l)	60-3780	P (mg/l)	<0,05 - 4,0
TOC (mg C /l)	22-6540	Oils and fat (mg/l)	10-3090
COD (mg O2/l)	135-61000	Na (mg/l)	13-160
BOD (mg O2/l)	54-7840	K (mg/l)	1,1-42
Mg (mg O2/l)	1,1-12	Fe (mg/l)	<0,05 - 174
Ca (mg/l)	4,0-152	Mn (mg/l)	<0,05 - 0,37

5.3. Wastewater treatments

To respect the parameters set by the respective Member State may be necessary to treat the efluents previous to discharge. The effluent treatments include namely the following options:

- Precipitation and flocculation with aluminum salts followed by sedimentation and filtration
- Treatment with activated carbon
- Treatment by wet air oxidation at relative low temperatures and pressures (below 150C degrees and 10 bar), followed by filtration
- Fotocatalytic treatment, in the presence of some irradiation titanium oxide.

However, most of these treatments, generate sludges that must be further processed.

In addition, the effluent resulting frequently need to be subject to various processing steps, making this approach, hardly sustainable for a single small or medium size footwear company.

5.4. Sustainable practices

This section presents some sustainable practices, including:

- Replace solvent based inks and lacquers in paint booths by water based products and / or less hazardous products to render less polluting water, with consequent reduction in the treatment costs and less amount of water renovarion
- Do not release hazardous substances, for example oils, solvents and detergents, in municipal or rain water collectors
- Perform preventive interventions in the systems in order to prevent clogging, flooding and unpleasant odours
- Remove the solids retained in the drainage grates, which must be placed in specific waste containers and adequately treated
- Carry out regular visual inspection of the pipes
- Give adequate and motivating training and information to the employees.

6. Waste

6.1. Introduction and concepts

In the last decades, the European footwear significantly invested in the more efficient use of raw materials, the elimination of dangerous substances during the production phase as well as in the management of industrial waste produced. However, the environmental gains made in production are being offset by rapid growth of the footwear consumption and decreasing trend of its useful life, itself relatively small, given the current patners in consumption and the market. This will lead to a significant production increase and consequently an increase of waste generated in the process as well as footwear used. Footwear waste is still mostly landfilled. It is therefore important to analyze, study and implement methodologies to minimize waste generated, value and manage it correctly from a sustainable holistic point of view.

The Directive 2008/98/EC of the 19th November - Waste Directive, establishes the applicable legal framework and introduces basic definitions essential to understand these matters, including:

'waste' – any substance or object which the holder discards or intends or is required to discard;

'hazardous waste' – waste which displays one or more of the hazardous properties (Annex III of Directive 2008/98/EC, changed Comission Regulation EU nº 1357/2014 of 18 December 2014);

'waste oils' – any mineral or synthetic lubrication or industrial oils which have become unfit for the use for which they were originally intended, such as used combustion engine oils and gearbox oils, lubricating oils, oils for turbines and hydraulic oils;

'bio-waste' – biodegradable garden and park waste, food and kitchen waste from households, restaurants, caterers and retail premises and comparable waste from food processing plants;

'waste producer' – anyone whose activities produce waste (original waste producer) or anyone who carries out pre-processing, mixing or other operations resulting in a change in the nature or composition of this waste;

'waste holder' – the waste producer or the natural or legal person who is in possession of the waste;

'dealer' – any undertaking which acts in the role of principal to purchase and subsequently sell waste, including such dealers who do not take physical possession of the waste;

'broker' – any undertaking arranging the recovery or disposal of waste on behalf of others, including such brokers who do not take physical possession of the waste;

'waste management' – the collection, transport, recovery and disposal of waste, including the supervision of such operations and the after-care of disposal sites, and including actions taken as a dealer or broker;

'prevention' – measures taken before a substance, material or product has become waste, that reduce:

- the quantity of waste, including through the re-use of products or the extension of the life span of products;
- the adverse impacts of the generated waste on the environment and human health; or
- the content of harmful substances in materials and products;

're-use'– any operation by which products or components that are not waste are used again for the same purpose for which they were conceived;

'treatment' – recovery or disposal operations, including preparation prior to recovery or disposal;

'recovery' – any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy. Annex II sets out a non-exhaustive list of recovery operations;

'preparing for re-use' – checking, cleaning or repairing recovery operations, by which products or components of products that have become waste are prepared so that they can be re-used without any other pre-processing;

'recycling' – any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations;

'disposal' – any operation which is not recovery even where the operation has as a secondary consequence the reclamation of substances or energy.

6.2. Wastes generated in a footwear company

In this chapter will be identified the most significant wastes produced by the sector as well as the best management options available.

6.2.1. Waste classification according to the European Waste List

The **European Waste List** establishes and classifies the wastes produced by the different activities. The different types of waste in the European Waste List (Article 7 of directive 2008/98/EC) are fully defined by a six-digit code for the waste and the respective two-digit and four-digit chapter headings. The list is divided into twenty groups/ chapters (please see bellow).

In general, the following steps should be taken to identify a waste in the list:

- Identify the source generating the waste in Chapters 01 to 12 or 17 to 20 and identify the appropriate six-digit code of the waste (excluding codes ending with 99 of these chapters). Note that a specific production unit may need to classify its activities in several chapters.
- If no appropriate waste code can be found in Chapters 01 to 12 or 17 to 20, the Chapters 13, 14 and 15 must be examined to identify the waste.
- If none of these waste codes apply, the waste must be identified according to Chapter 16
- If the waste is not in Chapter 16 either, the 99 code (wastes not otherwise specified) must be used in the section of the list corresponding to the activity identified in step one

The wastes that are considered as **hazardous waste**, are specifically enumerated in this list and marked with an asterisk (*).

EUROPEAN WASTE LIST CHAPTERS	
01	Wastes resulting from exploration, mining, quarrying, physical and chemical treatment of minerals
02	Wastes from agriculture, horticulture, aquaculture, forestry, hunting and fishing, food preparation and processing
03	Wastes from wood processing and the production of panels and furniture, pulp, paper and cardboard
04	**Wastes from the leather, fur and textile industries**
05	Wastes from petroleum refining, natural gas purification and pyrolytic treatment of coal
06	Wastes from inorganic chemical processes
07	Wastes from organic chemical processes
08	Wastes from the manufacture, formulation, supply and use (MFSU) of coatings (paints, varnishes and vitreous enamels), adhesives, sealants and printing inks
09	Wastes from the photographic industry
10	Wastes from thermal processes
11	Wastes from chemical surface treatment and coating of metals and other materials; non-ferrous hydro-metallurgy
12	Wastes from shaping and physical and mechanical surface treatment of metals and plastics
13	Oil wastes and wastes of liquid fuels (except edible oils, 05 and 12)
14	Waste organic solvents, refrigerants and propellants (except 07 and 08)
15	Waste packaging; absorbents, wiping cloths, filter materials and protective clothing not otherwise specified
16	Wastes not otherwise specified in the list
17	Construction and demolition wastes (including excavated soil from contaminated sites)
18	Wastes from human or animal health care and/or related research (except kitchen and restaurant wastes not arising from immediate health care)
19	Wastes from waste management facilities, off-site waste water treatment plants and the preparation of water intended for human consumption and water for industrial use
20	Municipal wastes (household waste and similar commercial, industrial and institutional wastes) including separately collected fractions

As we can observe the main wastes produced in the footwear industry shall be included in the Chapter 4 and may be the following:

04	WASTES FROM THE LEATHER, FUR AND TEXTILE INDUSTRIES
04 01	**wastes from the leather and fur industry**
04 01 01	fleshings and lime split wastes
04 01 02	liming waste
04 01 03*	degreasing wastes containing solvents without a liquid phase
04 01 04	tanning liquor containing chromium
04 01 05	tanning liquor free of chromium
04 01 06	sludges, in particular from on-site effluent treatment containing chromium
04 01 07	sludges, in particular from on-site effluent treatment free of chromium
04 01 08	waste tanned leather (blue sheetings, shavings, cuttings, buffing dust) containing chromium
04 01 09	wastes from dressing and finishing
04 01 99	wastes not otherwise specified
04 02	**wastes from the textile industry**
04 02 09	wastes from composite materials (impregnated textile, elastomer, plastomer)
04 02 10	organic matter from natural products (for example grease, wax)
04 02 14*	wastes from finishing containing organic solvents
04 02 15	wastes from finishing other than those mentioned in 04 02 14
04 02 16*	dyestuffs and pigments containing hazardous substances
04 02 17	dyestuffs and pigments other than those mentioned in 04 02 16
04 02 19*	sludges from on-site effluent treatment containing hazardous substances
04 02 20	sludges from on-site effluent treatment other than those mentioned in 04 02 19
04 02 21	wastes from unprocessed textile fibres
04 02 22	wastes from processed textile fibres
04 02 99	wastes not otherwise specified

6.2.2. Waste normally produced in a shoe Factory

The footwear manufacturing activity, produces various types of industrial waste, that are in the next paragrahs synthetically introduced by department, section or productive phase.

a. **Offices:** toner waste and computer consumables, paper and cardboard and domestic waste like fruit scraps, yogurt cups, water bottles

b. **Warehouses:** plastic packaging, paperboard and pallets of plastic, cardboard or wood;

c. **Production:**

Cutting: leather, fur, foams, textiles, synthetic materials, plastic blocks (swings) and cutting knifes;

Stitching: small strips of leathers and / or synthetic materials, liners, needles, eyelets and other small metal parts, ribbons, threads, used brushes, cleaning textiles, cardboard, plastic cones, sponges and empty containers of chemicals;

Assembly: nails / staples, metal parts, damaged parts of leathers or leather powder, contaminated cleaning textiles, brushes used, empty containers of chemicals, plastic, cardboard and used sandpaper;

Finishing: sulfite paper, plastic, cardboard, metal, dirty sponge's, brushes, containers of chemicals, contaminated cleaning textiles, dry card filters or aqueous suspensions containing paint or varnish, depending on the type of paint booth filter used.

d. **Warehouses of flammable products:** waste resulting from the containment spills, chemicals out of date or unused;

e. **Maintenance (building and equipment):** waste from construction and demolition, contaminated cleaning cloths, lubricants, oils, lamps, batteries, waste from equipment maintenance, electrical and electronic equipment waste and waste due to the maintenance of outdoor spaces (green areas);

f. **Social facilities (toilets / changing rooms and canteen):** Waste of feminine hygiene; waste equivalent to urban waste (food scraps, cooking oil), paper packaging, plastic and glass;

g. **Medical Office** – if curative care is given hospital waste as needles / sharps and blood contaminated waste.

The main industrial wastes potentially produced by a footwear company are summarized and classified in the following table:

Wastes generated	Posible Codes	Offices	Production	Warehouses	Warehouses of flammmable products	Maintenance (building and equipments)	Social Areas and sanitary facilities	Medical office
wastes of tanned leather (cuttings, buffing dust) containing chromium	04 01 08		x					
wastes from dressing and finishing	04 01 09		x					
wastes not otherwise specified	04 01 99		x					
aqueous suspensions containing paint or varnish	08 01 19 (*) 08 01 20		x					
waste printing toner	08 03 17(*) 08 03 18	x						
waste adhesives and sealants containing organic solvents	08 04 09(*)		x		x			
oils wastes not otherwise specified	13 08 99 (*)					x		
other halogenated solvents and solvent mixtures /	14 06 02(*) 14 06 04 (*)		x					
paper and cardboard packaging /Paper and cardboard	15 01 01 20 01 01	x	x	x	x	x	x	x
packaging containing residues of or contaminated by hazardous substances	15 01 10(*)		x		x			
absorbents, filter materials	15 02 02 (*) 15 02 03		x		x	x		
end-of-life vehicles	16 01 04 (*)					x		
discarded organic chemicals	16 05 08 (*) 16 05 09				x			
wastes from electrical and electronic equipment transformers and capacitors containing PCBs	16 02 11(*) 16 02 14 16 02 15 (*) 16 02 16 16 02 09 (*)					x		
batteries and accumulators	16 06 03 (*) 16 06 04 16 06 05					x		
fluorescent tubes and other mercury-containing waste	20 01 21 (*)					x		
plastic packaging plastics	15 01 02 20 01 39	x	x	x		x	x	x
metal	20 01 40		x			x		
municipal wastes not otherwise specified biodegradable waste oils and fats waste from sewage cleaning wastes not otherwise specified	20 03 99 20 02 01 20 01 08 20 01 25 20 03 06 20 03 04					x	x	

6.3. Wastes management principles and options

Waste management options must follow the principles and the hierarchy proposed by European legislation. This hierarchy is based in the following principles:

1. Prevention
Means the adoption of measures before a substance, material or product, take the nature of waste, that reduce: the amount of waste produced, including through the re-use of products or the extension of life span of products, adverse impacts on the environment and human health from waste produced or the content of harmful substances in materials and products.

2. Reuse
Means any operation by which products or components that are not waste are used again for the same purpose for which they were designed.

3. Recycling
Means any recovery operation, including the reprocessing of organic material, through which the constituents of the waste materials are reprocessed into products, materials or substances whether for the original purpose or for other purposes but which does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations.

4. Valorization
Means any operation whose main result is the transformation of the waste serving a useful purpose by replacing other materials which would otherwise have been used for a specific purpose or waste being prepared for this purpose in installation.

The valorization operations provided foreseen in European legislation include:

(Annex II of the Directive 2008/98/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 19 November 2008)

R 1	Use principally as a fuel or other means to generate energy
R 2	Solvent reclamation/regeneration
R 3	Recycling/reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes)
R 4	Recycling/reclamation of metals and metal compounds
R 5	Recycling/reclamation of other inorganic materials
R 6	Regeneration of acids or bases
R 7	Recovery of components used for pollution abatement
R 8	Recovery of components from catalysts
R 9	Oil re-refining or other reuses of oil
R 10	Land treatment resulting in benefit to agriculture or ecological improvement
R 11	Use of waste obtained from any of the operations numbered R 1 to R 10
R 12	Exchange of waste for submission to any of the operations numbered R 1 to R 11
R 13	Storage of waste pending any of the operations numbered R 1 to R 12 (excluding temporary storage, pending collection, on the site where the waste is produced).

5. Disposal
Includes any operation which is not recovery even if it is established as a secondary consequence the reclamation of substances or energy.

The disposal operations mentioned in European legislation are the following:

(Annex I of directive 2008/98/EC of the European Parliament and of the Council of 19/11/2008)

D 1 Deposit into or on to land (e.g. landfill, etc.)

D 2 Land treatment (e.g. biodegradation of liquid or sludgy discards in soils, etc.)

D 3 Deep injection (e.g. injection of pumpable discards into wells, salt domes or naturally occurring repositories, etc.)

D 4 Surface impoundment (e.g. placement of liquid or sludgy discards into pits, ponds or lagoons, etc.)

D 5 Specially engineered landfill (e.g. placement into lined discrete cells which are capped and isolated from one another and the environment, etc.)

D 6 Release into a water body except seas/oceans

D 7 Release to seas/oceans including sea-bed insertion

D 8 Biological treatment not specified elsewhere in this Annex which results in final compounds or mixtures which are discarded by means of any of the operations numbered D 1 to D 12

D 9 Physico-chemical treatment not specified elsewhere in this Annex which results in final compounds or mixtures which are discarded by means of any of the operations numbered D 1 to D 12 (e.g. evaporation, drying, calcination, etc.)

D 10 Incineration on land

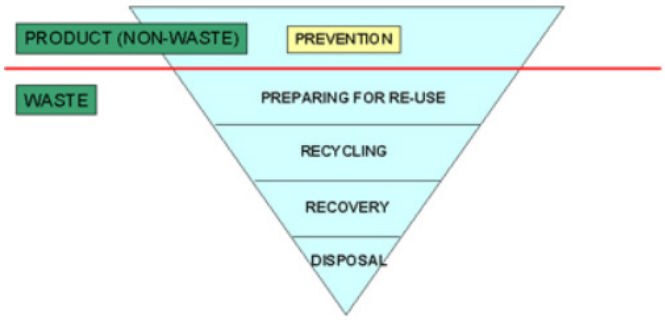
D 11 Incineration at sea D 12 Permanent storage (e.g. emplacement of containers in a mine, etc.)

D 13 Blending or mixing prior to submission to any of the operations numbered D 1 to D 12

D 14 Repackaging prior to submission to any of the operations numbered D 1 to D 13

D 15 Storage pending any of the operations numbered D 1 to D 14 (excluding temporary storage, pending collection, on the site where the waste is produced)

The basic principles of the waste management hierarchy described are summarized in the following scheme:



Waste management hierarchy

6.4. Footwear companies waste management

The following table summarizes for the main wastes produced in each section the management options available.

Wastes generated	Offices	Production	Warehouses	Warehouses of flammmable products	Maintenance (building and equipments)	Social Areas and sanitary facilities	Medical office	R 1– Prevention	R 2–Reuse	R 3–Recycle	R 4 –Valorization	R 5–Disposal
tanned leather (cuttings, buffing dust) containing chromium		x						x	x	x	x	x
wastes from dressing and finishing		x						x	x	x	x	x
wastes not otherwise specified		x						x	x	x	x	x
aqueous suspensions containing paint or varnish		x						x		x		x
waste printing toner	x							x	x	x		
waste adhesives and sealants containing organic solvents		x		x				x		x		x
oils wastes not otherwise specified					x			x		x	x	
other halogenated solvents and solvent mixtures /		x						x		x	x	
paper and cardboard packaging /paper and cardboard	x		x	x	x	x	x	x	x	x		
packaging containing residues of or contaminated by hazardous substances		x		x				x	x	x	x	
absorbents, filter materials		x		x	x		x	x		x		x
end-of-life vehicles					x			x	x	x		x
discarded organic chemicals				x				x		x		x
wastes from electrical and electronic equipment					x			x	x	x		x
batteries and accumulators					x			x	x	x		x
Sharps, wastes whose collection and disposal is not subject to special requeriments							x	x		x		x
fluorescent tubes and other mercury-containing waste					x			x		x		x
plastic packaging, plastics	x	x	x		x	x	x	x	x	x	x	x
metal		x			x			x	x	x	x	
municipal wastes not otherwise specified, biodegradable waste, oils and fats, waste from sewage cleaning					x	x		x		x		x

6.5. Implementation of management options

6.5.1. Separation and proper storage

The management of waste produced passes through prevention at the source, non mixing and separation by waste type at the place of production.

The mixture of waste is inadvisable because all non-hazardous waste may be contaminated and become dangerous, hindering its management and thereby increasing the costs associated with treatment.

On the other hand, the correct separation of waste enables the maximization of opportunities to reuse and recycle, reducing associated management costs.

Waste should be separated (not mixed) where they are generated. To facilitate the separation of waste a colour code for different types of waste may be adopted to support the identification of the containers. Possible standard colours include:

- BLUE: paper / cardboard;
- YELLOW: Plastic;
- GREEN: glass and metal;
- ORANGE: hazardous waste;
- BROWN: organic waste;
- GREY or BLACK: general non-recyclable waste or mixed or contaminated not subject to separation; the containers are placed in the spaces where waste is generated.

Pending collection and transportation, waste should be well packed and stored in specific spaces, contain their identification, and corresponding coding. It is very important to ensure that the temporary waste storage space has the following characteristics: it must be easily accessible to operators (for the arrival, collection and output), duly marked, and create the necessary conditions of hygiene and safety. On the other hand, it should be well sheltered from rain, sun and weathering. The floor must be waterproofed to prevent seepage into the ground.

6.5.2. Transport and destinations

It is the responsibility of the producer or holder of industrial waste, to ensure that transport is carried out by an authorized carrier and that the recipient is authorized/ properly licensed to receive them.

Road transport of waste can be accomplished namely by:

- The waste producer;
- Operators licensed in accordance with applicable law to transport industrial wastes;
- Operators licensed in accordance with applicable law to transport hazardous wastes;
- Organisations responsible for the management of hospital hazardous waste;
- Organisations responsible for the management of municipal waste;
- Companies licensed for the carriage of goods for hire or reward.

The waste transport must be made in environmentally appropriate conditions in order to prevent its spread noting in particular the following requirements:

- The liquid and pasty waste must be packaged in sealed containers, whose filling rate does not exceed 98%;
- Solid waste can be packed in containers or transported in bulk in Box Vehicle or open box vehicle with the load adequately covered;
- All elements of a load must be suitably arranged and anchored to the vehicle in order to prevent displacement between them or at the walls of the vehicle;
- When loading, while riding or in the discharge, if a spill occurs, the affected area should be cleaned immediately, using absorbent products, in the case of liquid and pasty waste.

It is important to note that the producer, holder and the waste carrier are jointly liable for waste transport and damages associated to it.

In order to organize and make available information on authorized operators by type of waste EU Member States established procedures and tools. In Portugal, for example, the application "SILOGR - Licensing Information System of Waste Management Operations" (https://silogr.apambiente.pt) allows to search and identify the operators which have license for each particular type of waste management.

6.5.3. Waste tracking forms

For each transport of wastes must be issued a Waste Tracking Form, whose main objective is to identify the wastes, the quantities, the transportation route and the destination of the wastes. This form covers the various stakeholders in waste management processes: (1) producer, (2) transporter and (3) reuse, recycling, valorization or disposal.

The footwear companies should check that the Waste Tracking Forms are duly signed by the waste receptor and keep on file proof copies for the legal period set in the respective Member State.

6.6. Packaging Management

The recovery and recycling of packaging waste carrying the finished footwear should be increased to reduce its environmental impact.

The legal framework that regulates this issue is Directive 94/62/CE of the European Parliament and of the Council of 20th December 2004, changed by the Directive 2004/12/CE of the European Parliament and of the Council of 11th February 2004 and the Directive 2005/20/CE of the European Parliament and of the Council of 9th March 2005.

This Directive establish among others that at the level of each Member State the databases shall provide information on the magnitude, characteristics and evolution of packaging and packaging waste flows (including information on the toxicity or danger of packaging materials and components used for their manufacture). Member States shall ensure that the sum of the concentration levels of lead, cadmium, mercury and hexavalent chromium present in packaging or packaging components does not exceed the values defined in the Directive.

6.6.1. Concepts

To understand and implement the legal requirements applicable to footwear some definitions and concepts are following introduced:

'Packaging' – all products made of any materials, whatever their nature, used for the containment, protection, handling, delivery and presentation of goods, from raw materials to processed goods, from the producer to the user or consumer. All items "disposable" used for the same purposes must be considered as packages.

The definition of 'package' includes:

a. sales packaging or primary packaging - packaging conceived so as to constitute a sales unit to the final user or consumer at the point of purchase;

b. grouped packaging or secondary packaging - ie packaging conceived so as to constitute at the point of purchase a grouping of a certain number of sales units, whether they are sold as such to the final user or consumer;

c. transport packaging or tertiary packaging - packaging conceived in order to facilitate handling and transport of a number of sales units or grouped packagings in order to prevent physical damage during handling and transport.

'Packaging waste' – means any packaging or packaging material covered by the definition of waste in Directive 75/442/CEE, excluding production residues;

'Reuse' – any operation by which packaging, which conceived and designed to accomplish a minimum number of trips or rotations during its life cycle is refilled with or without the support of auxiliary products present on the market enabling the new filling of own packaging or reused for the same purpose for which it was conceived; such reused packaging will become packaging waste when no longer subject to reuse;

'Non-reusable packaging' – those of one end, which consequently become packaging waste after consumption of the product contained, going later be accounted for compliance with national recycling and recovery targets;

'Reusable packaging' – packages are designed and engineered to meet during its life cycle a minimum number of trips or rotations. These packages are filled again, with or without the support of auxiliary products present on the market enabling the refilling of the packaging itself, and used for the same purpose for which they were designed. Reusable packaging become waste containers when they cease to be reused.

6.6.2. Packaging of footwear placed on the EU market

The responsibility for the design of the packaging of footwear, management and disposal of the packaging waste is of the packager/ importer that places the product in a national market.

Usually the companies associate to an existing management system contractualising with a licensed entity, the Green Dot Society in the respective Member State. Packaging covered by this contract is identified with the Green Dot marking of a symbol. This symbol is used by a European network of organizations that recycle packaging - Pro Europe.

Green dot symbol - Identifies the transfer of packaging management obligation

Proper marking shall be affixed on the package or on the label, clearly visible and easy to read. The marking shall be appropriately durable and lasting, including when the packaging is opened.

The "Green Dot" has evolved into a proven concept in many countries by implementation of Producer Responsibility management pronciple. Industry in twenty-eight nations is already using the "Green Dot" as the financing symbol for the organisation of recovery, sorting and recycling of sales packaging.

The footwear companies can also implement an own system for managing waste of the non-reusable packaging placed on the national markets with its brand, but its implementation is complex and requires an authorization of the competent Member State authorities.

6.7. Circular economy: "systemic change" needed to address resource scarcity

The circular economy is a vital step towards more efficient use of resources, reduction of dependence on resources and also brings savings in material costs. The product Ecodesign is very important in this process as it will facilitate the repair, reuse and recycling of these products.

The transition to a more circular economy is essential to enable the realization of the agenda on efficient use of resources under the 2020 strategy for smart, sustainable and inclusive growth. A significant and sustained improvement in the efficient use of resources is something that is within our reach and that could bring great economic benefits.

Circular economy systems aim maintaining the added value of products for as long as possible and eliminate the waste. Keep the resources in the economy when the products reach the end of its useful life, so that they can continue to be used productively and generate more value. The transition to a more circular economy requires changes in all value chains, from the design of products to new business models and markets, from new ways of processing of waste resources to new consumer behavior patterns. This implies a complete systemic change and innovation, not only technological, but also within the organization, society, finance and policy. The industry already recognizes the strong economic rationale for improving resource productivity. In footwear several aspects need to be considered namely the following:

Ecodesign
There must be a vision targeted to the product life cycle. Definition of criteria such as durability, repairability, reusability and recycling in the design process is relevant.

Systemic change

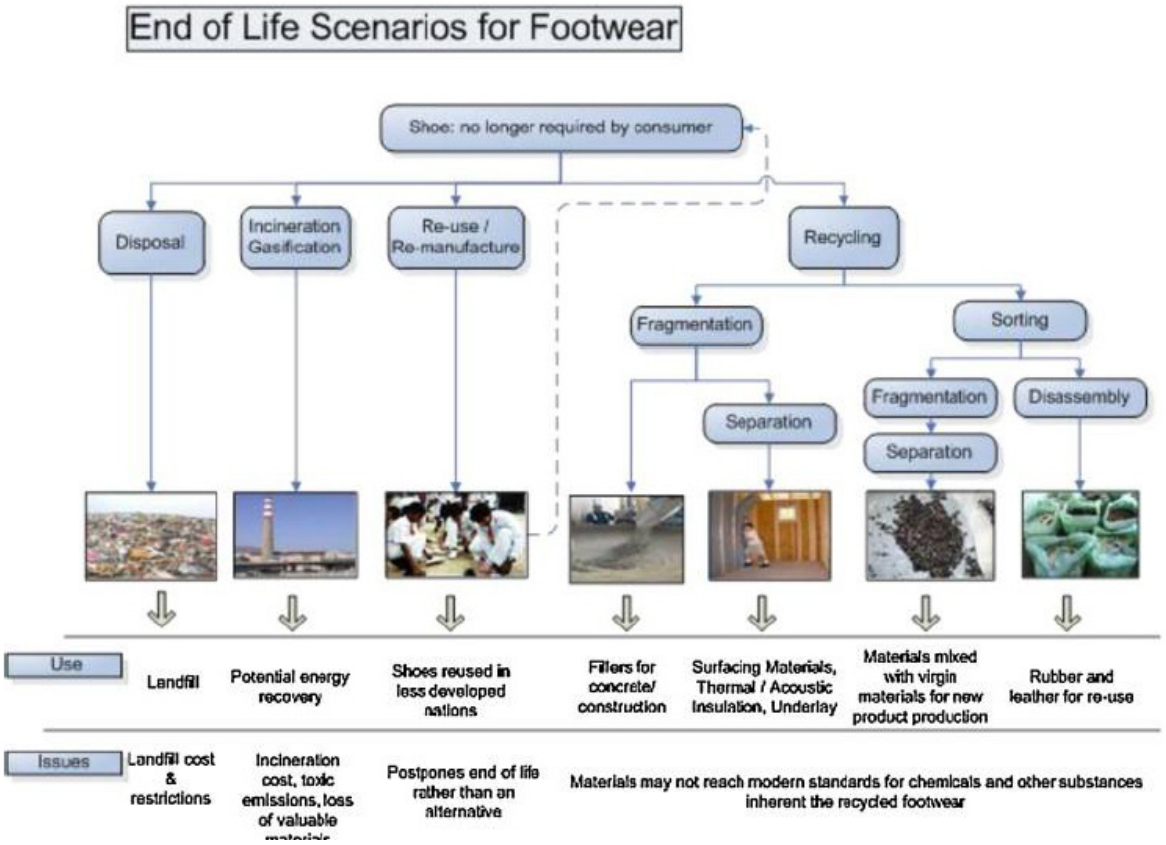
To tackle the problem of scarce resources, the extraction and use of resources must be reduced and the link between growth and the use of natural resources must be severed. In order to switch to the sustainable use of resources several measures are requires, including:

- A reduction in absolute terms of resource consumption to sustainable levels;
- Strict application of the waste hierarchy;
- Implementation of a cascading use of resources;
- Greater use of renewables,
- Phasing-out of toxic substances;
- Improvements in the quality of services.

End of life scenarios of the used footwear products

In previous chapeters and subchapters the options available to manage production emission were tackled. Thus, in the following figures are presented different End of Life (EoL) scenarios for the footwear products depending on the materials used in its construction.

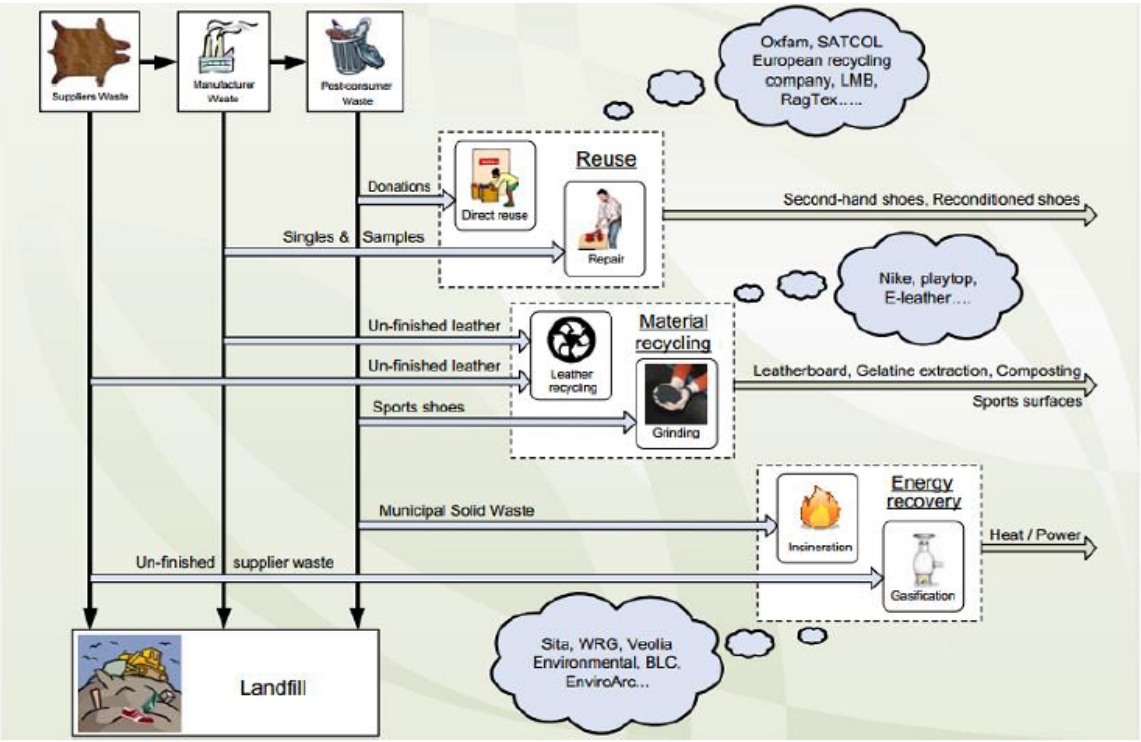
The main EoL options concerning the postconsumer of footwear are: landfill, incineration/gasification, reuse and recycling. Each one with its environmental impacts, economic benefits and technical requirements.



End of Life Scenariosf or Postconsumer Footwear Products[1]

[1] Lee, M.J.; Rahimidard, S.; *An air based automated material recycling system for postconsumer footwear products;* Resources, Conservation and Recycling; 69 (2012) 90-99.

The current recycling solutions available for the some of the wastes generated are presented in the following diagram.



Current Recycling Solutions [2]

[2] Rahimifard, S.; Satikos, T.; Coates, G.; *Recycling of Footwear Products.* A position paper prepared by the Centre for Sustainable Manufacturing and Reuse/recycling Technologies (SMART) Loughborough University, Leicestershire, UK (2007).

7. Environmental noise

It is part of European Union policy to achieve a high level of health and environmental protection and one of the objectives to be pursued is protection against noise.

7.1. Main legislation, definitions and concepts

The Directive 2002/49/EC of the European Parliament and of the Council of 25th June 2002 regards the assessment and management of environmental noise. This Directive shall apply to environmental noise to which humans are exposed in particular in built-up areas, public parks or other quiet areas in an agglomeration, in quiet areas in open country, near schools, hospitals and other buildings and areas sensitive to noise.

Definition and concepts relevant to understand and implement the obligations and best pratices applicable to footwear manufacturing include the following:

'Environmental noise' – means unwanted or harmful outdoor sound created by human activities, including noise emitted by means of transport, road, rail, air and sites of industrial activity;

'Harmful effects' – harmful effects on human health; "Annoyance" – means the degree of annoyance by environmental noise on the population, determined by means of field surveys;

'Noise indicator' – means a physical scale for the description of environmental noise that has a relationship with a harmful effect;

"Assessment" – any method to calculate, predict, estimate or measure the value of a noise indicator or the harmful effects associated with it;

- Lden is day-everning-night noise indicator
- Lday is day-noise indicator for annoyance during the day period
- Levening is evening noise indicator, for annoyance during the evening period
- Lnight , night noise indicator, for sleep disturbance

'Quiet area in an agglomeration' – area, delimited by the competent authority, for instance which is not exposed to a value of Lden or of another appropriate noise indicator greater than a certain value set by the Member State, from any noise source;

'Dose-effect relationship' – the relationship between the value of a noise indicator and a harmful effect;

'Strategic noise map' – a map to the global assessment of noise exposure in a given area due to different noise sources or for overall predictions for such an area;

'Limit value' – means a value of Lden or Lnight, and where appropriate, Lday and Levening, as determined by the Member State, which, if exceeded, gives or may give rise to noise abatement measures by the authorities competent; the limit values may be different for different types of noise (road, rail or air, industrial noise, etc.), different surroundings and the degree of sensitivity of the population to noise; They may also be different for existing situations and for new situations (where there is a change in the situation regarding the noise source or the use of the surrounding);

'Action plans' – plans designed to manage noise issues and effects, including noise reduction if necessary.

7.2. Noise effects

Environmental noise affects a large number of Europeans and is considered by the public as one of the biggest environmental problems. The human being has a high capacity to adapt to different environments, but when is exposed above certain levels of noise, this may become problematic, on the physiological level and psychological level, interfering with basic activities such as sleep, rest, study and communication. We can consider quantifiable and measurable effects and whose occurrence is easily perceived as hearing loss, decreased intelligibility of beeps. On the other hand, there are effects of subjective nature, which includes: discomfort, irritability, decreased attention span, increasing the likelihood of accidents, reduced productivity and income, abnormal fatigue, psychological stress, and yet physiological effects also non-hearing, and metabolic disorders, cardiovascular disorders, gastrointestinal disorders problems, chemical changes in the blood and urine, abnormal respiration, insomnia, and also stress and muscle tension.

In summary,

- **Quantifiable and measurable effects:** hearing loss, decreased intelligibility of beeps.
- **Subjective nature effects:** discomfort, irritability, abnormal fatigue, psychic tension.
- **Non-auditory physiological effects:** metabolic changes, cardiovascular problems, insomnia, stress.

7.3. Footwear main noise sources and management options

The **main environment noise emissions sources** in the footwear companies are:

- Compressor and compressed air reservoir;
- Central vacuum system;
- Ventilation systems;
- Engines of localized suction systems;
- Cargo operations / unloading of goods;
- Air conditioning system.

These equipaments and systems, are frequently located outside the industrial buildings, so the footwear companies, should undertake assessments of environmental noise in order to compliance with the limit values of noise indicators defined by each Member State. These assessments in Portugal must be performed by accredited laboratories.

If applicable, measures should be adopted under the noise reduction action plan, which identifies and determines priorities, including the exceeding of any relevant limit value.

7.4. Prevention and minimization of noise best prectices

Best practices and actions to prevent and minimise noise can include:

- Adequatly design the plant, the buildings and possible structures that will accommodate the noisiest equipments;
- Consider ventilation, compressed air and all noisiest systems in the factory design and implementation phases;
- Ensure preventive maintenance of plant and equipment in order to detect possible noise changes, correct defects and reduce noise;
- Carry out the characterization of noise levels whenever there are changes in processes with disturbances in noise;
- Soundproofing sites where the noise is significant (using screens);
- Use absorbent panels in the lining of certain areas;
- Plan noisiest equipment replacement (or some components) in order to reduce noise levels;
- Use of dampers in the points of application of hydraulic power;
- Installation of fans in anti-vibration bases;
- Use devices silencers in the ventilation ducts;
- Plan the charges and discharges of material according to the reference periods and the exposure limit values.

8. Energy efficiency

This chapter mainly analyzes the technical solutions that can be adopted to improve energy efficiency, as well the achieved or anticipated savings.

Overall, in the footwear sector, is possible to adopt three types of actions or investments to improve energy efficiency:

- Low cost – active energy management, sound maintenance, insulation;
- General power solutions – engines, compressors, power generation on site;
- Specific solutions – process controls or new machines adapted.

In the following paragrahs are presented some of the main options available to the footwear industry to improve energy efficiency.

Low Cost Solutions
The starting point for improving energy efficiency is ensuring an efficient energy management. Assess, monitor and set goals (Monitoring & Targeting - M & T) is an energy efficiency technique based on standard management practice that "you can not manage what you can not measure".

"M & T" techniques, provide information on the operating practices, results of energy management projects and guidance on the level of energy consumption that is expected in a given period. This technique also gives early warning of unexpected excessive consumption caused by malfunction of some equipment, operator error, unwanted users and lack of effective maintenance or similar problems. The purpose of such actions is to help:

- Manage energy consumption, instead of considering a fixed cost;
- Identify and explain the excessive use of energy;
- Detecting situations where the consumer is unexpectedly larger or smaller than expected;
- See energy consumption trends (daily, weekly, seasonal, and operational);
- Determine the use and energy costs in the future when planning changes in the business;
- Diagnose specific areas of wasted energy;
- Develop performance targets for energy management programs.

Small to medium investment solutions
We can also indicate other solutions "low cost", although involve some investment, including:

- LED Lighting;
- Fluorescent lamps;
- Detection of air leaks in the compression system;
- Intelligent Compression System Layout;
- Heat recovery from compressors;
- Charge controllers;
- High efficiency motors.

Optimization / power electrical contractor (voltage)
Optimization of voltage is an energy saving technology which involves controlled and systematic reduction in tensions contracted by an energy consumer in order to reduce consumption. Usually the voltage received by a user is higher than the levels required by the equipment and machines.

The voltage optimization systems are typically installed in series with the power network of a building, allowing all the electric benefit from an optimized supply of systematic and regular way to optimize the voltage supplied to the building in line with what is really necessary. The benefits of this optimization vary according to the specific needs of each company, depending on existing equipment. This optimization will be beneficial when the electricity supply is a higher voltage level than needed, resulting in excessive energy consumption and high electricity bills.

The presence of excessive stress can also cause a reduction in the lifetime of the equipment and increases in energy consumption with no improvement in performance.

Photovoltaic systems
The solar photovoltaic systems are arrays of cells that convert sunlight into electricity that can be used to power electrical appliances and lighting. Businesses have much to gain from the solar photovoltaic systems, since typically use a lot of electrical devices during the manufacturing process. Costs will vary according to the scale of the operation and the size of arrays. The benefits of photovoltaic solar panels include:

- Lower utility bills electricity;
- Income generated power;
- Generate electricity whenever daylight;
- Systems with easy maintenance;
- Long life and durable components;
- Fast installation of solar panels;
- Decreased carbon footprint, since theres is no emissions;
- Provide a positive image of the company.

Variable speed drives / Inverters
A speed variato, is an engine controller that drives an electric motor by varying the frequency and voltage supplied to the motor. A variable speed drive can still be designated as: inverter frequency, adjustable speed drive, frequency converter, AC drive, and micro drive inverter. Frequency is directly related to engine speed (revolutions per minute -RPMs). In other words, the faster the frequency is, the higher the engine speed. If an application does not require an electric motor to run at full speed, the speed variator can be useful to reduce the frequency and voltage in order to satisfy the electric motor load requirements. If there are changes in engine speed requirements, the unit can simply turning up or down the engine speed required to meet the requirement.

Motors, pumps, compressors already existing can be equipped with these devices; new engines or new machines usually already incorporate these features. With the installation of these devices or new engines, the companies report energy savings of about 15% and return on investment of 1-6 years.

Compressors
Compressed air is used in a variety of manufacturing processes, especially in the shoe and leather industry. The air compression process may be a waste - the total energy supplied to a compressor only 8-10 percent can be converted into useful energy, necessary for carrying out the work. Minimising waste is vital to a correct approach can save up over 30% of the energy used. The following measures are recommended:

- Managing the system correctly
- For example, check the compressed air that is actually needed and identify the processes where it is appropriate and set a usage policy. Compressed air is expensive, which can be seen as a free resource and is often misused especially when there are cheaper options for certain processes.
- Reduce pressure
- Compressed air is often used at maximum compressor pressure - make small cuts and verify that operations are not affected. Check that the compressor using is the right size for the job perform.
- Test and repair leaks
- Any small leak is a waste of energy and money, so it should hold up a test "no load" to check for leaks.
- Switch off the compressors when not in use

A compressor in slow motion uses about 40% of its total load. If necessary, turn off the compressor when not in use.

The potential savings depends on the system in place, but companies report that better management and / or investment in new, more efficient compressors, or compressors with a more suitable capacity requirement, saving about 20% of the energy used and the return is only 1 year.

Lighting systems
Efficient lighting systems have evolved in recent years. Currently some systems allow energy savings of at least 50% compared to existing systems by installing LED lighting or fluorescent lamps or energy efficient light bulbs as T5.

However, in shoe factories, enlightenment is not a major consumer of energy, although it is worth considering. The best choice will depend on each space and application used. The LED lighting is very efficient and the lights are long lasting with low maintenance requirements. However, the LED alone are not always the most appropriate response. The high costs of their own lights and in many cases the hardware and wiring - may outweigh the benefits, while in some applications, innovative lighting solutions using traditional technology, controls and motion sensors and daylight, can substantially improve the efficiency and return on investment.

A significant number of companies have pursued a piecemeal approach, upgrading lights and lighting systems on a replacement basis, or in an area at a time. Experience reports of the companies to implement investment plans in this area are varied. Energy savings with upgrades to LED lights walk between 45% and 75%, with payback periods also vary widely, depending on each individual installation (return in 1-3 years is the most common, but some companies have reported 10-15 years).

Specific solutions
Companies can also save energy by implementing improvements in its own production processes. The replacement of equipment and old machines with newer models allows for significant energy savings (about 30-35%) but at a relatively high cost of capital (10 years return). In most cases, energy savings would be an additional benefit, rather than a master controller.

Ensure the efficient plant layout - especially in relation to hot water and compressed air systems - optimized processing temperatures and hours of work combined with the requests for production are also good practice to consider.

9. Life cycle assessment, greenhouse gases emissions and environment labels and declarations

9.1. Life Cycle Analysis

Life Cycle Assessment (LCA) is an internationally standardised methodology (ISO 14040). LCA helps to quantify the environmental pressures related to goods and services (products), the environmental benefits, the trade-offs and areas for achieving improvements taking into account the full life-cycle of the product.

Life Cycle Inventory (LCI) and **Life Cycle Impact assessment** (LCIA) are consecutive parts of a Life Cycle Assessment, where:

- Life Cycle Inventory is the collection and analysis of environmental interventions data (e.g. emissions to e.g. air and water, waste generation and resource consumption) which are associated with a product from the extraction of raw materials through production and use to final disposal, including recycling, reuse and energy recovery.
- Life Cycle Impact Assessment is the estimation of indicators of the environmental pressures in terms of e.g. climate change, summer smog, resource depletion, acidification, human health effects, etc. associated with the environmental interventions attributable to the life-cycle of a product.

LCA has been used increasingly by some industries to help reduce the overall environmental burdens across the whole life cycle of goods and services. LCA is also used to improve the competitiveness of the company's products, in communication with governmental bodies, as a tool to improve product design, for example the choice of materials, the selection of technologies, specific design criteria and when considering recycling. LCA allows benchmarking of product system options and can therefore also be used in decision making of purchasing and technology investments, innovation systems, among other. The benefit of LCA is that it provides a single tool that is able to provide insights into upstream and downstream trade-offs associated with environmental pressures, human health and the consumption of resources. These macro-scale insights complement other social, economic and environmental assessments.

The data used in LCA should be consistent and quality assured and reflect actual industrial process chains.

Methodologies should reflect a best consensus based on current practice.

LCA can also support in:

- the selection of relevant indicators of environmental performance, including measurement techniques, and
- marketing (e.g. implementing an Eco labelling scheme, making an environmental claim, or producing an environmental product declaration).

LCA addresses the environmental aspects and potential environmental impacts throughout a product's life cycle from raw material acquisition through production, use, end-of-life treatment, recycling and final disposal (i.e. cradle-to-grave).

There are four phases in an LCA study:

a. the goal and scope definition phase;

b. the inventory analysis phase;

c. the impact assessment phase;

d. the interpretation phase.

Website to visit:
http://eplca.jrc.ec.europa.eu/

Other standards

- ISO 14044:2006 – Environmental management – Life cycle assessment – Requirements and guidelines.
- ISO/TR 14047:2012 - -Environmental management – Life cycle assessment – Illustrative examples on how to apply ISO 14044 to impact assessment situations.
- ISO 16759: 2013 – Quantification and communication for calculating the carbon footprint of print media products
- ISO 13315-2:2014 – Environmental management for concrete and concrete structure. Part 2: System boundary and inventory data

- ISO/TS 14071:2014 – Environmental management – Life cycle assessment – Critical review processes and reviewer competencies: Additional requirements and guidelines ISO 14044:2006.
- ISO/TS 14072:2014 – Environmental management – Life cycle assessment – Requirements and guidelines for organizational life cycle assessment

LCA Softwares
There are available several tools to support the LCA such as SimaPro[3] , GaBi LCA[4] , LCA Calculator[5] .

9.2. Greenhouse gases emissions and footwear farbon footprint

There is a vast number of international standards adsressing environmental related topics, namely:

- ISO 14001 Environmental management systems—Requirements with guidance for use
- ISO 14004 Environmental management systems—General guidelines on principles, systems and support techniques
- ISO 14006 Environmental management systems—Guidelines for incorporating ecodesign
- ISO 14015 Environmental assessment of sites and organizations
- ISO 14020 series (14020 to 14025) Environmental labels and declarations
- ISO 14030 discusses post-production environmental assessment
- ISO 14031 Environmental performance evaluation—Guidelines
- ISO 14040 series (14040 to 14049), Life Cycle Assessment, LCA, discusses pre-production planning and environment goal setting.
- ISO 14046 sets guidelines and requirements for water footprint assessments of products, processes, and organizations. Includes only air and soil emissions that impact water quality in the assessment.
- ISO 14050 terms and definitions
- ISO 14062 Integrating environmental aspects into product design and development (2002)
- ISO 14063 environmental communication guidelines and examples (2006)[10]
- ISO 14064 measuring, quantifying, and reducing greenhouse gas emissions
- ISO 19011 specifies one audit protocol for both 14000 and 9000 series standards together
- ISO 14046:2014 - Environmental management – Water footprint – Principles, requirements and guidelines.
- ISO 16745:2015 – Environmental performance of buildings – Carbon metric of building – Use stage

From the list indicated above, this sub-chapter will focus on standards 14064 and 14020, respectively related to (1) measuring, quantifying and reducing greenhouse gas emissions and (2) environmental labels and declarations; given its relative importance for the footwear sector.

The **ISO 14064** international standard addresses the **quantification and verification of greenhouse gas** (GHG) to support organizations in their projects and GHG inventories (commonly called the carbon footprint).

ISO 14064 has applications for both for the private and the public sector. For businesses, the standard provides the steps to developing an inventory that is not only able to be easily verified but can be compared to the inventories of other organizations. By using the standard as a guide, these businesses can reduce costs of conducting and verifying an inventory. Because the standard represents consensus on technical GHG inventory best practices, these businesses can also have greater confidence in the inventories that are produced and these inventories have more credibility with stakeholders.

ISO 14064 consists of three parts, each with a different technical focus.

[3] www.pre-sustainability.com/simapro
[4] www.gabi-software.com
[5] www.lcacalculator.com

Part 1 of the standard is titled "Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals." This part of the standard addresses conducting greenhouse gas emission inventories of organizations such as corporations using a bottom up approach to data collection, consolidation and emissions quantification.

Part 2 of the standard addresses quantification and reporting of emission reductions from project activities. Because of the different approach to emissions accounting associated with project activity relative to organizational inventories, this sub-chapter will not include discussion of ISO 14064, Part 2.

Part 3 of the standard is titled "Specification with guidance for the validation and verification of greenhouse gas assertions." This part of the standard establishes a process for verification of a greenhouse gas statement, including organization inventories, regardless of whether or not the inventory was developed under Part 1. This verification process is also applicable whether the verification is being conducted by an independent third party verifier or by an organization's internal auditors.

Key aspects regarding ISO 14064 "GHG inventories"
ISO 14064, Part 1 includes eight major sections with over 21 subsections discussing GHG inventory issues for organizations. At the beginning, the standard establishes and defines general GHG inventory principles of relevance, completeness, consistency, accuracy, and transparency. These principles serve to assist with both interpretation of the standard as well as general guidance for addressing issues that fall beyond the practices established by the standard.

Within the primary text, the standard identifies three key aspects for developing a greenhouse gas inventory for organization. These aspects include setting inventory boundaries, quantifying GHGs, and reporting GHGs.

Boundaries for a GHG inventory include both the organizational boundaries and the operational boundaries. Organizational boundaries refer to defining which facilities are recognized as part of organization conducting the inventory and should be included within this inventory. Two approaches to defining organizational boundaries are by control and according to equity share. Under the control approach, an organization looks at facilities where it has authority to implement either financial or operational policies, then accounts for all GHG emissions from facilities where it does have control.

Under the equity share approach, the organization accounts for emissions from all facilities in which it has some equity interest (even a minority), but accounts for only a percentage of the total emissions equal to the share it has in the particular facility or sub-entity.

Operational boundaries refer to which operational activities at a facility are included in the inventory. Direct GHG emissions, or emissions that result from activities directly under an organizations control, such as combustion of fossil fuels to generate heat, are always included within the inventory. Indirect GHG emissions, or emissions that result from organization activities but are generated outside the boundaries of the organization's direct control, may or may not be included.

Indirect emissions from electricity generation are always included but other indirect emissions, such as those resulting from employee travel in non-organization owned vehicles (e.g. commercial airlines) are optionally included. ISO 14064 Part 1 establishes a process for quantifying GHG emissions for the inventory. The first steps of this process are identification of specific emission sources within the operational boundaries as well as selection of an emissions quantification methodology applicable for the sources identified. The next steps are the collection of data required by the methodology for the source and the identification of established emission factors for the data collected. Finally, the data and the emission factors, applied consistent with the quantification methodology, are used to quantify emissions from individual emission sources. The emissions quantified for each source are then consolidated with the other sources within the operational boundaries, but ensuring that direct and indirect sources are kept separate.

With respect to GHG inventory reporting, ISO 14064 establishes that the report for each reporting period should identify the entity's organizational boundaries, the GHG emissions from individual operational categories, and the methodologies used to quantify those emissions. The report should include appropriate explanation regarding these inventory components, especially any exclusions from within the established boundaries or adjustments to the methodologies. The report should also identify what particular standards (including ISO 14064 for example) or programs the inventory was conducted consistent with and whether verification relative to these standards or programs was undertaken.

It is important to note that the key aspects for conducting a greenhouse inventory under ISO 14064 are generally consistent with, and in most cases are derived from, those identified by the broadly recognized Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard developed bythe World Business Council for Sustainable Development and the World Resources Institute. The difference between these two documents is that the GHG Protocol identifies, explains, and provides options for GHG inventory best practices, while ISO 14064 establishes minimum standards for compliance with these best practices. Though different in a few minor areas, the protocol and the ISO standard are complementary documents with ISO identifying what to do and The GHG Protocol explaining how to do it and organizations developing GHG inventories, especially those that will seek independent verification, can benefit from using both the standard and the protocol as references.

Key aspects regarding ISO 14064 "verification"

Part 3 of ISO 14064 established for the first time a process for conducting a verification of a GHG assertion, such as an organization's GHG inventory report. ISO 14064 verification process was developed using best practices derived from financial accounting techniques and environmental auditing as well as verification experiences from emerging GHG schemes and programs such the Kyoto Protocol's Clean Development Mechanism and the United Kingdom's Emission Trading Scheme.

ISO 14064 Part 3 also begins with established principles for conducting GHG verification. These principles include independence, ethical conduct, fair presentation, and due professional care. Similar to those provided for inventories, these principles are provided to generally guide the verification process as well as to assist with interpretation and addressing issues that are not addressed by the standard.

The ISO 14064 Part 3 verification establishes "fundamentals" for the verification. These fundamentals include the verification level of assurance (defined as either limited or reasonable), objectives, criteria, and scope, which all serve as points of reference regarding the expectations and level of effort required by the verification. The verification fundamentals also include definition of materiality under the verification. The most important aspect of verification performance, materiality refers to the level of assertion accuracy sought through the verification, relative to the interests of the intended users of the assertion. A materiality threshold identifies when omissions, errors or misstatement within an assertion or the data it is based upon are considered significant or insignificant.

A GHG assertion verification under ISO 14064 includes performance of assessments in three areas: review of the GHG information system, evaluation of the GHG data, and comparison the assertion against verification criteria. Review of the GHG information system seeks to identify those areas in the system that could result in a potential misstatement occurring. Evaluation of the GHG data looks to see if such system risks did result in a misstatement occurring that affects the accuracy of the assertion.

Finally, comparing the assertion against verification criteria identifies if the assertion was developed consistent with the standards or program requirements that it claimed to follow.

The ultimate objective for performing these assessments is the formation of a verification statement (or verifier's opinion) on the GHG inventory assertion. A favorable verification opinion identifies that the GHG inventory assertion is consistent with the criteria identified and contains information that would allow users to make accurate decisions based upon that assertion. Opinion may also identify inconsistencies against the identified criteria, identify qualifications regarding or limitations of the information it contains, or generally identify that the assertion may not be reliable for application to the intended user's decision-making.

CO2Shoe – Footwear Carbon Footprint[6]
The CO2Shoe is an on going project to develop a carbon footprint calculation tool for the footwear sector, which allows the measurement of the greenhouse gas (GHG) emissions produced by each pair of shoes.

The project involves four EU member states: Spain, Italy, Portugal and Poland, and will subsequently extend to the rest of the European area. The aim at the end of the project is to provide footwear companies with the use of this tool, which will allow them to identify the most needed aspects for lowering their GHG emissions. This project is partially funded by the European Union through Life+ Programme "LIFE12 ENV/ES/000315".

The project expected results include:

- Creation of a carbon footprint calculation tool for footwear able to quantify GHG emissions, expressed in CO2 equivalents.
- Application of the calculation tool to 36 different footwear styles produced by the 12 participating companies from 4 EU member states (Spain, Italy, Portugal and Poland).
- Reduction of GHG emissions released into the atmosphere (Carbon Footprint) in the footwear styles produced by the companies participating in the project and thus, contributing to improve the state of the environment.
- Identification of solutions addressed to reduce GHG emissions that can be applied in the footwear industry.
- Incorporation of Eco-design in production models as a way to improve products from an environmental perspective from their initial stage.
- Promotion of the carbon footprint calculation tool specific for the footwear sector within the European area.
- Awareness raising about the environmental impact, in terms of contribution to global warming, derived from production processes among footwear sector's companies.

9.3. Environment labels and declarations

The governments, businesses and citizens concerns to the environment are at the origin of environmental labeling. The recognition by business that environmental concerns can be translated into market advantages for certain products or services, has led to several statements, securities and environmental labels. On the consumer side, the existence of several statements, securities and environmental labels led to confusion and ignorance in which they can trust. Without reference standards and without a certification by an independent third party, consumers feel no guarantee that this product or service is in fact the environmentally preferable alternative. This concern led to the emergence of public and private organizations labels certification.

According to ISO - International Standards Organization - the aim of an eco-label is "to encourage the demand and supply of products that cause less pressure on the environment throughout its life cycle, through communication of verifiable and reliable information not misleading, about the environmental aspects of products and services "(ISO 14020: 1998). Thus, the eco-labels differentiate the company certification systems (EMAS, ISO 14001) aimed at communicating with actors other than the consumer, such as the state, banks, insurance companies and shareholders.

The International Organization for Standardization (ISO) has identified three broad types of voluntary labels:

Type I - Eco-labels certified independent and voluntary program based on multiple criteria, which assigns labels to products and allows differentiation between products belonging to the same category of products based on their environmental performance and lifecycle considerations. An independent organization defines a diverse set of criteria and the transparency and credibility of these is ensured through certification by an independent third party.

Type II - Environmental self-statements are statements developed by manufacturers, importers or distributors in order to communicate information on the environmental aspects of its products or services.

[6] www.co2shoe.eu

Type III - Environmental product declarations the eco-labels type III provide standard information of Life Cycle Assessment about a product or service, through diagrams presenting a set of relevant environmental indicators (global warming, resource consumption, waste generation, among others), accompanied by an interpretation.

Under the Ecolabel of the European Union (ELEU) and Regulation (Regulation (EC) Nº 1980/2000 of 17 July):

- The product term includes any goods or services (nº 1 of Article 1 of Regulation (EC) No 1980/2000);
- A product group means any goods or services that serve similar purposes and are equivalent in terms of use and consumer perception (Reg. No 1980/2000, n.º 1, art 2,);
- The consumer term includes professional consumers (n.º 1 of Article 1 of Regulation)

The European Ecolabel is a voluntary scheme designed to encourage the market to the supply and demand for more eco-efficient products and services so that they are easily identifiable by consumers. The flower is used in all EU countries as well as Norway, Liechtenstein and Iceland.

As a market instrument, the main function of the EU eco-label is to stimulate both supply the demand for products with reduced environmental impact. With regard to the offer, the EU Ecolabel has the clear objective of encouraging the market to offer green products and services, officially recognized. On the demand side the aim is to make the client a critical consumer.

Details regarding footwear ecolabel criteria can be found at the following site:
http://ec.europa.eu/environment/ecolabel/products-groups-and-criteria.html

Beyond footwear products, there are other products that can use the Eco-label: cleaning products for all purposes and toilets; detergents for dishwashing machine and manual washing, laundry detergents, soaps and shampoos (developing criteria), utensils, dish machines, lamps, personal, portable computers, refrigerators (developing criteria) televisions, vacuum cleaners, washing machines, heaters (developing criteria), home and garden, mattresses, furniture (developing criteria), products for flooring, paint and interior varnishes, soil fertilizers (developing criteria), household textiles, clothing, textiles, tourism, camping services, hotel services, lubricants, paper, copy paper and graph paper for printing and paper products.

Once awarded the Ecolabel, the product or service can benefit from all the marketing initiatives undertaken by the European Commission and the relevant bodies, in particular the "Green Warehouse" (www.eco-label.com) to advertise their products.

10. Environmental Responsibility

10.1. Legal framework and concepts

The purpose of the Directive 2004/35/CE of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage, is to establish a framework of environmental liability based on the 'polluter-payer' principle, to prevent and remedy environmental damage.

The fundamental principle of this Directive is that an operator whose activity has caused the environmental damage or the imminent threat of such damage is to be held financially liable, in order to induce operators to adopt measures and develop practices to minimise the risks of environmental damage so that their exposure to financial liabilities is reduced.

The most relevant definitions are:

'Environmental damage' that means:

- Damage to protected species and natural habitats, which is any damage that has significant adverse effecton reaching or maintaining the favourable conservation status of such habitats or species;
- Damage to protected species and natural habitats does not include previously identified adverse effects which result from an act by an operator which was expressly authorised by the relevant authorities.
- Water damage, which is any damage that significantly adversely affects the ecological, chemical and/or quantitative status and/or ecological potential, as defined in Directive 2000/60/EC, of the waters concerned;
- Land damage, which is any land contamination that creates a significant risk of human health being adversely affected as a result of the direct or indirect introduction, in, on or under land, of substances, preparations, organisms or micro-organisms;

'Damage' – means a measurable adverse change in a natura resource or measurable impairment of a natural resource service which may occur directly or indirectly;

'Operator' – any natural or legal, private or public person who operates or controls the occupational activity or, where this is provided for in national legislation, to whom decisive economic power over the technicalfunctioning of such an activity has been delegated, including the holder of a permit or authorisation for such an activity or the person registering or notifying such an activity;

'Emission' – the release in the environment, as a result of human activities, of substances, preparations, organisms or micro-organisms;

'Imminent threat of damage' – a sufficient likelihood that environmental damage will occur in the near future;

'Preventive measures' – any measures taken in response to an event, act or omission that has created an imminent threat of environmental damage, with a view to preventing or minimising that damage;

'Remedial measures' – any action, or combination of actions, including mitigating or interim measures to restore, rehabilitate or replace damaged natural resources and/or impaired services, or to provide an equivalent alternative to those resources or services

´Natural resource' – protected species and natural habitats, water and land;

'Services' and 'natural resources services' – the functions performed by a natural resource for the benefit of another natural resource or the public;

'Baseline condition' – the condition at the time of the damage of the natural resources and services that would have existed had the environmental damage not occurred, estimated on the basis of the best information available;

'Recovery', including 'natural recovery' – means, in the case of water, protected species and natural habitats the return of damaged natural resources and/or impaired services to baseline condition and in the case of land damage, the elimination of any significant risk of adversely affecting human health;

'Costs' – costs which are justified by the need to ensure the proper and effective implementation of the Directive including the costs of assessing environmental damage, an imminent threat of such damage, alternatives for action as well as the administrative, legal, and enforcement costs, the costs of data collection and other general costs, monitoring and supervision costs.

10.2. Applicability

This legal framework applies to:

1. The environmental damage caused by any of the occupational activities listed (Annex III of directive for completed activities) and to any imminent threat of such damage occurring by reason of any of those activities.

The following list presents in simplified form examples of the main activities that may be applicable to footwear:

- All discharges into the inland surface water, which require prior authorisation in pursuance of Council Directive 76/464/EEC of 4 May 1976 on pollution caused by certain dangerous substances, discharged into the aquatic environment.
- All discharges of substances into groundwater which require prior authorisation in pursuance of Council Directive 80/68/EEC of 17 December 1979 on the protection of groundwater against pollution caused by certain dangerous substances.
- The discharge or injection of pollutants into surface water or groundwater which require a permit, authorisation or registration in pursuance of Directive 2000/60/EC.
- Manufacture, use, storage, processing, filling, release into the environment and onsite transport of:
- dangerous substances as defined in Article 2(2) of Council Directive 67/548/EEC of 27 June 1967 on the approximation of the laws, regulations and administrative provisions of the Member States relating to the classification, packaging and labelling of dangerous substances;
- dangerous preparations as defined in Article 2(2) of Directive 1999/45/EC of the European Parliament and of the Council of 31 May 1999 concerning the approximation of the laws, regulations and administrative provisions of the Member States relating to the classification, packaging and labelling of dangerous preparations;

2. Damage to protected species and natural habitats caused by any occupational activities other than those listed in Annex III, and to any imminent threat of such damage occurring by reason of any of those activities, whenever the operator has been at fault or negligent.

10.3. Preventive and remedial actions

Where environmental damage has not yet occurred but there is an imminent threat of such damage occurring, the operator shall, without delay, take the necessary preventive measures.

The competent authority may, at any time:

- Require the operator to provide information on any imminent threat of environmental damage or in suspected cases of such an imminent threat;
- Require the operator to take the necessary preventive measures;
- Give instructions to the operator to be followed on the necessary preventive measures to be taken or itself take the necessary preventive measures.

Where environmental damage has occurred the operator shall, without delay, inform the competent authority of all relevant aspects of the situation and take all practicable steps to immediately control, contain, remove or otherwise manage the relevant contaminantsand/or any other damage factors in order to limit or to prevent further environmental damage and adverse effects on human health or further impairment of services and the necessary remedial measures, (in accordance with Article 7 of directive).

The competent authority may, at any time:

- Require the operator to provide supplementary information on any damage that has occurred;
- Take, require the operator to take or give instructions to the operator concerning, all practicable steps to immediately control, contain, remove or otherwise manage the relevant contaminants and/or any other damage factors in order to limit or to prevent further environmental damage and adverse effect on human health, or further impairment of services;
- Require the operator to take the necessary remedial measures;
- Give instructions to the operator to be followed on the necessary remedial measures to be taken; or itself take the necessary remedial measures.

In any case, the competent authority shall require that the remedial measures are taken by the operator. If the operator fails to comply with the obligations cannot be identified or is not required to bear the costs under this Directive, the competent authority may take these measures itself.

10.4. Determination of remedial measures and costs

Operators shall identify, (in accordance with Annex II) potential remedial measures and submit them to the competent authority for its approval.

The competent authority shall decide which remedial measures shall be implemented in accordance with directive and with the cooperation of the relevant operator, as required.

Where several instances of environmental damage have occurred in such a manner that the competent authority cannot ensure that the necessary remedial measures are taken at the same time, the competent authority shall be entitled to decide which instance of environmental damage must be remedied first.

In making that decision, the competent authority shall have regard, inter alia, to the nature, extent and gravity of the various instances of environmental damage concerned, and to the possibility of natural recovery. Risks to human health shall also be taken into account.

The competent authority shall invite the persons on whose land remedial measures would be carried out to submit their observations and shall take them into account.

The operator shall bear the costs for the preventive and remedial actions taken pursuant to this Directive.

In certain cases, the competent authority shall recover, inter alia, via security over property or other appropriate guarantees from the operator who has caused the damage or the imminent threat of damage, the costs it has incurred in relation to the preventive or remedial actions taken under this Directive.

However, the competent authority may decide not to recover the full costs where the expenditure required to do so would be greater than the recoverable sum or where the operator cannot be identified.

An operator shall not be required to bear the cost of preventive or remedial actions taken pursuant to this Directive when he can prove that the environmental damage or imminent threat of such damage:

- Was caused by a third party and occured despite the fact that appropriate safety measures were in place; or
- Resulted from compliance with a compulsory order or instruction emanating from a public authority other than an order or instruction consequent upon an emission or incident caused by the operator's own activities.

In such cases Member States shall take the appropriate measures to enable the operator to recover the costs incurred.

The Member States may allow the operator not to bear the cost of remedial actions taken pursuant to this Directive where he demonstrates that he was not at fault or negligent and that the environmental damage was caused by:

- An emission or event expressly authorised by, and fully in accordance with the conditions of, an authorization conferred by or given under applicable national laws and regulations which implement those legislative measure adopted by the Community specified in Annex III of directive, as applied at the date of the emission or event;
- An emission or activity or any manner of using a product in the course of an activity which the operator demonstrates was not considered likely to cause environmental damage according to the state of scientific and technical knowledge at the time when the emission was released or the activity took place.

10.5. Financial guarantees

Any company of footwear manufacturing carrying out one or more activities listed in annex III to Directive 2004/35/CE, shall provide a financial guarantee enabling it to assume environmental responsibility inherent to the activity as you developed.

The company of footwear manufacturing can set up one or more financial guarantees, and autonomous. These guarantees may be alternative or complementary to each other. Warranties obey the principle of exclusivity, and may not be diverted for other purposes nor subject to any encumbrance, total or partial, or incidental.

Financial guarantees can be made through:

- Underwriting of insurance policies;
- Obtaining bank guarantees;
- Participation in environmental funds;
- Establishment of own funds set aside for the purpose.

The bank guarantees shall be:

- Contracted with a banking activity authorized institution of the country
- Autonomous and the first request ("first demand");
- Unconditional and irrevocable;
- Paid within 24 hours. The beneficiary of the bank guarantees shall be the competent authority in the country.

The value of the financial guarantee must be established based on the estimated costs of the measures to prevent and repair the damage potentially involved.
To this end, the operator must:

1. Perform the characterization of occupational activity, including all operations that involve risks to the environment.

2. Identify the initial state: analyze the current situation of protected species and natural habitats, the bodies of surface water and groundwater and soils in the environment of occupational activity, likely to be affected by situations of risk arising from occupational activity.

3. Identify and analyze the risk foreseeable scenarios, that is, those incidents likely to cause environmental damage with non-negligible probability of occurrence, such as the accidental release of hazardous substances, fire, explosions, among others.

4. Evaluate the environmental damage associated with the foreseeable risk scenarios.

5. Define the programmes of measures for the prevention and remedying of environmental damage, in accordance with the provisions laid down in annex V of Directive

6. Determine the cost of the measures referred to.

The identification of the "initial state" to be carried out by the company of footwear manufacturing should focus on the three environmental components covered by the law, where applicable, in particular:

- Protected species and natural habitats: delimitation of natural habitats with legal protection status and identification of the natural distribution of the species of flora and fauna, according to the best information available.
- Water: identification of bodies of surface water and groundwater and its State
- Soil: soil physical and chemical characteristics, according to the best information available.

Environmental responsibility policy specifies no risk analysis methodology, by which the company of manufacturing footwear may adopt that which best adapt to occupational activity developed and the environmental damage that this can cause Risk analysis can also identify scenarios whose risk can be minimized by adopting new measures and therefore be able to contribute to decrease the cost of measures to prevent and repair the damage potentially involved in factory.

The implementation of the environmental risk analysis to be made to the occupational activity, within the scope of this regulation, may be held by the operator himself or external entity contracted to the effect.

Each S2S partner will adapt the specific features applicable to his own country in the course.

11. Test of knowledge

Choose the correct option:

Q1. The definition of "waste" according to Directive 2008/98 / EC of 19 November is:

- ○ any substance or object which the holder discards
- ○ any substance or object that must be discarded
- ○ any substance or object which the holder discards or intends or is required to discard

Q2. "Disposal" according to Directive 2008/98 / EC of 19 November is:

- ○ any operation which is not recovery even where the operation has as a secondary consequence the reclamation of substances or energy
- ○ any operation which is recovery even where the operation has as a secondary consequence the reclamation of substances or energy
- ○ both are incorrect

Q3. The different types of waste in the European Waste List (Article 7 of directive 2008/98/EC) are fully defined by:

- ○ the six-digit code for the waste and the respective three-digit and four-digit chapter headings
- ○ the six-digit code for the waste and the respective two-digit and four-digit chapter headings
- ○ the six-digit code for the waste and the respective two-digit and three-digit chapter heading

Q4. The main wastes produced in the footwear industry is included in the Chapter 4, that is:

- ○ wastes from the leather, fur and textile industries
- ○ wastes from organic chemical processes
- ○ wastes from the manufacture, formulation, supply and use (MFSU) of coatings (paints, varnishes and vitreous enamels), adhesives, sealants and printing inks

Q5. Waste management options must follow the principles and the hierarchy proposed by European legislation. The hierarchy is based in the following principles:

- ○ Prevention, recycling, reuse, valorization and disposal
- ○ Recycling, reuse, prevention, valorization and disposal
- ○ Prevention, reuse, recycling, valorization and disposal

Q6. Reuse means:

- ○ any operation by which products or components that are not waste are used again for the same purpose for which they were designed
- ○ any operation by which products or components that are not waste are used again for other purpose
- ○ both are incorrect

Q7.	**The producer, holder and the waste carrier are jointly liable for waste transport by damage. This afirmations is:**

- ○ False
- ○ True
- ○ True just to hazardous waste

Q8.	**'Packaging waste' means:**

- ○ any packaging or packaging material covered by the definition of waste in Directive 75/442/CEE, excluding production residues;
- ○ any packaging or packaging material covered by the definition of waste in Directive 75/442/CEE, inlcuding production residues;
- ○ both are incorrect

Q9.	**The management of waste produced passes through:**

- ○ correct separation and good destination
- ○ prevention at the source, non-mixing and separation by waste type at the place of production
- ○ all wastes in the same container, covered and well located for transport

Q10.	**It is important that the transport of wastes**

- ○ It is carried out by fast and safe carriers
- ○ It is carried out by experienced operators
- ○ It is carried out by authorized carriers

Q11.	**The carrier, before starting the transport of wastes, must complete a Waste Tracking Form. This form covers information of:**

- ○ producer, transporter, destination, waste code, quantity, treatment code
- ○ producer, transporter, waste code, quantity, treatment code
- ○ producer, transporter, waste code, quantity, treatment code and vehicle weight

Q12.	**The types of waste covered by Waste Tracking Form are**

- ○ all types of waste including construction and demolition waste and hospital waste
- ○ all types of waste including construction and demolition waste
- ○ industrial waste

Q13. **Footwear manufacturing involves the use of chemicals including primers, glues and paints. These chemicals are used mainly in:**

- ○ cutting and sewing operations
- ○ assembling and finishing
- ○ sewing operations, assembling and finishing

Q14. **'waste gases' means:**

- ○ the final gaseous discharge containing volatile organic compounds or other pollutants from a stack or abatement equipment into air
- ○ the final gaseous discharge containing volatile organic compounds or other pollutants from a process;
- ○ any emissions not in waste gases of volatile organic compounds into air, soil and water as well as solvents contained in any products

Q15. **In the footwear sector, volatile organic compounds (VOC), commonly known in the industry as organic solvents or only solvents, are particularly associated with the use of the following chemicals:**

- ○ Primary, water based glues, halogenating, paints and brightness;
- ○ Primary, solvent based glues, halogenating, paints and brightness;
- ○ Primary, solvent based glues, paints and brightness;

Q16. **The Directive 2010/75/EU imposes to the footwear companies a total emission limit value (ELV), when the annual consumption of organic solvents exceeds:**

- ○ 5 tonne of solvent/year
- ○ 4 tonne of solvent/year
- ○ 8 tonne of solvent/year

Q17. **The Directive 2010/75/EU imposes the total emission limit value (ELV) in the footwear companies of:**

- ○ 24 g solvent/pair
- ○ 23 g solvent/pair
- ○ 25 g solvent/pair

Q18. **The emission limit value, for emissions of halogenated volatile organic compounds which are assigned or need to carry the hazard statements H341 or H351, where the mass flow of the sum of the compounds causing the hazards statements H341 or H351 is greater than, or equal to, 10 g/h is:**

- ○ 3 mg/Nm3
- ○ 2 mg/Nm3
- ○ 5 mg/Nm3

Q19. **Channels to which abatement equipment is connected, and which at the final point of discharge emit more than an average of 10 kg/h of total organic carbon, shall be monitored:**

- ○ Continuously
- ○ One a year
- ○ Twice a year

Q20. **The monitoring of the emissions into the atmosphere should be carried out with the installation working in:**

- ○ maximum conditions
- ○ minimum conditions
- ○ normal conditions

Q21. **The number of flanges to be installed:**

- ○ In stacks with a diameter over 35 centimetres (or ≥ 13,8 inches) or under 35 centimetres are 2
- ○ In stacks with a diameter over 35 centimetres (or ≥ 13,8 inches) are 2 and under 35 centimetres is 1
- ○ In stacks with a diameter over 35 centimetres (or ≥ 13,8 inches) are 3 and under 35 centimetres is 1

Q22. **The solvent consumption of one glue, in tons, considering 2800 liters of consumption, 82% solvent and density 775,66 kg/m3, is:**

- ○ 2,296 ton
- ○ 2,171 ton
- ○ 0,763 ton

Q23. **To determinate the solvent consumption is needed several information, such as:**

- ○ Identify the products used in production, number of pairs produced, Material Safety Data Sheets, Initial and final stock of chemicals
- ○ Identify products containing volatile organic solvents used in footwear manufacture, Material Safety Data Sheets, Initial and final stock of chemicals
- ○ Identify products containing volatile organic solvents, Material Safety Data Sheets, Initial and final stock of chemicals containing volatile organic solvents

Q24. **Fugitive emissions means**

- ○ emissions discharged in stacks and emissions released on tables and windows of volatile organic compounds, as well as solvents contained in any products
- ○ any emissions of volatile organic compounds into air, soil and water as well as solvents contained in any products, except waste gases
- ○ emissions discharged on tables and windows of volatile organic compounds

Q25. Environmental noise means:

- ○ unwanted or harmful outdoor sound created by human activities, including noise emitted by means of transport, road, rail, air and sites of industrial activity
- ○ a physical scale for the description of environmental noise that has a relationship with a harmful effect
- ○ the degree of annoyance by environmental noise on the population, determined by means of field surveys

Q26. The main environment noise emissions sources in the footwear companies are:

- ○ Cargo operations / unloading of goods
- ○ Air conditioning system
- ○ Compressor / compressed air reservoir and

Q27. L_{den} is day-everning-night noise indicator to:

- ○ manufacture of footwear
- ○ Quiet area in an agglomeration
- ○ None of the above is true

Q28. Strategic noise map, is a map to

- ○ the global assessment of noise exposure in a given area due to different noise sources or for overall predictions for such an area
- ○ the global assessment of noise exposure in the factory
- ○ the global assessment of noise exposure in the area where the company enters

Q29. Water intended for human consumption means:

- ○ The water intended to be drink;
- ○ The water that is intended to be drink or be in contact with other parts of human body;
- ○ All water consumed in the company;

Q30. The water for human consumption must:

- ○ Not contain any concentration of micro-organisms, parasites or any other substance which constitutes a potential human health risk;
- ○ Meet the minimum requirements (microbiological and chemical parameters and those relating to radioactivity);
- ○ Both previous paragraphs

Q31. The main sources of Industrial wastewater in the footwear sector are from:

- ○ sanitary facilities and social areas
- ○ finishing cabins with water curtain, hydro systems connected to the carding machine;
- ○ sanitary facilities, social areas and finishing cabins with water curtain, hydro systems connected to the carding machine

Q32. The domestic effluents may be discharged:

- ○ In the network of municipal or industrial collectors or closed tanks/containers
- ○ Discharged directly into the soil or river
- ○ Preferentially In closed tanks/containers even if there is municipal collector

Q33. Industrial effluents proper management and treatment include:

- ○ Discharge in an industrial collector following the guidelines of the managing network
- ○ Storage in containers for an unlimited time
- ○ Both previous paragraphs

Q34. The Environmental Responsibility is applicable to:

- ○ protected species and natural habitats, water, land and air
- ○ all species and natural habitats, water, land and air
- ○ protected species and natural habitats, water and land

Q35. In Environmental Responsibility, the main activities that are applicable to a footwear operator are:

- ○ use flammable substances
- ○ use, storage, processing, release dangerous substances into the environment
- ○ use and storage dangerous substances

Q36. The determination of costs on environmental responsibility of a footwear operator is defined with:

- ○ The costs of assessing environmental damage, imminent threat of such damage and indirect costs
- ○ Costs of assessing environmental damage, if very detailed, with varied scenarios
- ○ The costs of measures to repair the damage potentially involved

Q37. Financial guarantees in environmental responsibility can be taken through:

- ○ Insurance policies
- ○ Insurance policies, bank guarantees or participation in environmental funds
- ○ Preferentially bank guarantees, because is paid within 24 hours

Q38. Life Cycle Assessment is an internationally standardised methodology (ISO 14040) is related to:

- ○ Goods
- ○ Services
- ○ Goods and services

Q39. The main function of the EU eco-label is:

- ○ To stimulate supply for products with reduced environmental impact
- ○ To stimulate both supply the demand for recyclable products
- ○ To stimulate both supply the demand for products with reduced environmental impact

Q40. The Green dot symbol used in shoe packaging:

- ○ means that is a recyclable package
- ○ identifies the transfer of packaging management obligation
- ○ means that is a durable and lasting package

Answer Key:

Q1.	any substance or object which the holder discards or intends or is required to discard
Q2.	any operation which is not recovery even where the operation has as a secondary consequence the reclamation of substances or energy
Q3.	the six-digit code for the waste and the respective two-digit and four-digit chapter headings
Q4.	wastes from the leather, fur and textile industries
Q5.	Prevention, reuse, recycling, valorization and disposal
Q6.	any operation by which products or components that are not waste are used again for the same purpose for which they were designed
Q7.	True
Q8.	any packaging or packaging material covered by the definition of waste in Directive 75/442/CEE, excluding production residues;
Q9.	prevention at the source, non-mixing and separation by waste type at the place of production
Q10.	It is carried out by authorized carriers
Q11.	producer, transporter, waste code, quantity, treatment code
Q12.	all types of waste including construction and demolition waste
Q13.	sewing operations, assembling and finishing
Q14.	the final gaseous discharge containing volatile organic compounds or other pollutants from a stack or abatement equipment into air
Q15.	Primary, solvent based glues, halogenating, paints and brightness
Q16.	5 tonne of solvent/year
Q17.	25 g solvent/pair
Q18.	2 mg/Nm^3
Q19.	Continuously
Q20.	normal conditions
Q21.	In stacks with a diameter over 35 centimetres (or ≥ 13,8 inches) are 2 and under 35 centimetres is 1
Q22.	0,763 ton
Q23.	Identify products containing volatile organic solvents, Material Safety Data Sheets, Initial and final stock of chemicals containing volatile organic solvents
Q24.	any emissions of volatile organic compounds into air, soil and water as well as solvents contained in any products, except waste gases
Q25.	unwanted or harmful outdoor sound created by human activities, including noise emitted by means of transport, road, rail, air and sites of industrial activity
Q26.	Compressor / compressed air reservoir and
Q27.	None of the above is true
Q28.	the global assessment of noise exposure in a given area due to different noise sources or for overall predictions for such an area
Q29.	The water that is intended to be drink or be in contact with other parts of human body
Q30.	Both previous paragraphs

Answer Key:

Q31.	finishing cabins with water curtain, hydro systems connected to the carding machine
Q32.	In the network of municipal or industrial collectors or closed tanks/containers
Q33.	Discharge in an industrial collector following the guidelines of the managing network
Q34.	protected species and natural habitats, water and land
Q35.	use, storage, processing, release dangerous substances into the environment
Q36.	The costs of assessing environmental damage, imminent threat of such damage and indirect costs
Q37.	Insurance policies, bank guarantees or participation in environmental funds
Q38.	Goods and services
Q39.	To stimulate both supply the demand for products with reduced environmental impact
Q40.	identifies the transfer of packaging management obligation

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Lifelong Learning Programme

Project Number:
539823-LLP-1-PT-LEONARDO-LMP

Project Duration:
30 months
October 2013 - March 2016

How to implement Sustainable Manufacturing in Footwear - New Occupational Profile and Training Opportunities -

The project *STEP to SUSTAINABILITY* aims at:

Developing a new qualification profile and correspondent training in the field of sustainable manufacturing.

Training technicians with knowledge and skills to implement manufacturing strategies envisaging the sustainability in Footwear and Leather goods.

www.step2sustainability.eu

This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.