Austrian Eco Label for printed paper products

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Abstract

Austrian Eco Label for printed paper products applies to offset and electro-photographic digital printing methods. The environmental requirements contained in these criteria provide the printing company with guidance on how to contribute to sustainable development.

A printing company with the Austrian Eco Label has shown that it fulfils a number of environmental requirements which make it as least polluting as possible. This applies to the entire supply chain. The requirements encompass firstly the printing process and the paper and chemicals used by the printing company.

In case of digital printing, toners must be free of substances which could cause reproductive harm. They must be able to be reused or supplied to a material recycling scheme. The deinkability of toners has to be proven, which might be the most challenging requirement for digital printers.

Austrian Eco-Label - General

The "Austrian Eco-Label" was created on the initiative of the Federal Ministry of Environment, Youth and Family Affairs (1990). This label provides the general public with information on the environmental impact of consumer goods that arises from their production, usage and disposal and attracts the attention of consumers to alternative environmentally friendly products.

The Label itself was designed by the well-know Austrian artist, Friedensreich Hundertwasser. The very impressive label symbolizes earth, water, air, nature.

Objectives

The Austrian Eco-Label addresses itself primarily to consumers but also to manufacturers. The Eco-Label is intended to offer consumers a means of orientation at the point of sale. It draws the consumer's attention to environmentally friendly or friendlier products among those wares that are on offer. In this context environmentally friendly means "more environmentally-friendly as compared to the very harmful effects inflicted by other products fulfilling the same function". The aim is to so influence the demand for goods that preference is given to products least hazardous to environment.

Yet the Eco-Label should also motivate producers and traders to develop and offer less environmental-polluting products. In this way, a dynamic process could be triggered in the market, which influences the supply-structure in the direction of more environmentally friendly goods (competition effect).

Furthermore, the Eco-Label contributes to more transparency in the evaluation of the environmental impact of products. Products carrying the Eco-Label have to meet a series of criteria, the fulfilment of which is determined by an expert jury.

Further, the label is carried by only those proven environmentally compatible products, which exhibit a suitable fitness for use (quality). In this way the Eco-Label guarantees a high environmental standard without having to fear a loss of quality or safety.

Working out the award criteria

The products or services for which award criteria are set are subjected to an all embracing and unified evaluation. Here are recorded not only the environmental effects of the use of the product or service but also the production process, disposal as well as safety, quality and fitness for use ("cradle-to-grave approach").

The basis for evaluating the environmental compatibility of products is thus to be found in:

- Consumption of raw materials and energy
- Toxicity of contents
- Emissions (e.g. exhaust gases, sewage, noise)
- Disposal/recycling (wastes, suitability for recycling)
- Packaging
- Distribution and transportation (as required)
- Quality, safety
- Longevity, ease of repair.

The result of the product evaluation is the elaboration of product-specific Eco-Label.

Award Procedure and Participants

Responsibility for the administration and preparation of award criteria lies in the first place with the Federal Ministry of Environment, and the Austrian Consumer Association (VKI). Furthermore, two panels – the Eco-label Advisory Board and the expert groups – were founded. The members sitting on these panels include apart from the above mentioned institutions representatives of organisations from the areas of environmental protection, manufacturing and consumer protection as well as independent experts.

The Eco-Label Advisory Board

The Eco-Label Advisory Board under the chairmanship of the Federal Ministry of Environment fulfils in particular the following tasks:

- Decision on product groups for which criteria are to be determined
- Laying down general conditions for the elaboration of the award criteria
- Discussion of and passing a resolution on draft criteria presented to the Advisory Board

The Expert Groups

Under the chairmanship of the Austrian Consumer Association an expert group is newly formed for each new product group. These expert groups are similarly composed of specialists from the domains of the environment, manufacturing and consumer protection. The task of theses expert groups is to discuss proposals regarding criteria and where possible, to come to a unanimous decision in passing a draft set of environmental criteria.

If the expert group passes a draft of criteria, the Eco-Label Advisory Board must confirm the draft. Insofar as nothing to the contrary is determined, criteria enter into effect, following their publication, on the first day of the month of the respective calendar quarter. Criteria are valid for four years. The period can be reduced following environmental technological innovations, which are expected to appear on the market in the near future or a change in the law.

Awarding the Eco-Label

A third party test has to be performed to prove that a product complies with the respective Eco-Label criteria. Given a positive certificate the Austrian Eco-Label is awarded by the Federal Ministry of Environment. The label may be used for a period of 4 years and may be extended later on. Up to now about 300 licenses have been awarded. Eco-Labelled products and services achieve a turnover of about 300 million Euros a year.

Austrian Eco-Label Criteria for Printed Paper Products

Austrian Eco-Label criteria for printed paper products apply to offset and electro-photographic digital printed products. Printers, editors, newspapers or other publishers may apply for a license.

Life Cycle Assessments (LCAs) on printed matter all point at paper as the overall dominating contributor to the impacts from the life-cycle of this category of products. This dominating role of paper is primarily founded in the energy-related impact categories global warming, acidification and nutrification. A more recent LCA was elaborated to support criteria development of the Nordic Swan, the Eco-Label of the Nordic countries Sweden, Norway, Finland, Denmark and Iceland, and the EU Eco-Label. It includes chemical parameter and show that (offset) printing contributes to a greater extend to environmental impacts [1].

Nevertheless ecological criteria for paper are crucial for environmental friendly printed products. Therefore Austrian Eco-Label requires the use of paper which is Eco-labelled by national Eco-Labelling Systems, ISO 14024 Type I - e.g. the Austrian-, German-, Scandinavian- or the EU Eco-Label. Alternatively paper may be used which fulfils several emission limits which are derived from EU Eco-Label criteria for "graphic an copy paper" and slightly changed according to Austrian environmental priorities. Therefore emission parameters are to be calculated according to the reverence values in table 1. Points are to be calculated for each emission parameter, like in the example for chemical oxygen demand (COD).

$$P_{COD} = 10 \times (COD_{paper}/COD_{Referenz})$$

Table 1: calculation of emission parameters

Parameter	Hurdle	Reference	Weighting
COD	≤ 37,5kg/t	25 kg/t	10 %
AOX	≤ 0,25 kg/t	0,07kg/t	20 %
SO_2	≤ 1,35 kg/t	0,9 kg/t	10%
NO_x	≤ 3,45 kg/t	2,3 kg/t	10 %
CO_2	≤ 1100 kg/t	733 kg/t	40 %
$WOOD_{CERT}$	≥ 10 %	0 %	10 %

To qualify for the Eco-Label the weighted number of points shall not exceed 100, whereas individual emission parameters shall not exceed the proposed limit values. A certified environmental managements system, e.g. ISO 14001 or EMAS, is required.

Printing and post-press processes involve a wide range of chemicals, such as solvents, dyes, cleaning agents, etc. where a number of the substances used are environmental pollutants and health hazards, and could have a considerable negative impact on the recycling of products.

Criteria for electro-photographic digital printing

Digital printing has not been assessed in the former mentioned LCA by Larsen et al., but it is obvious that digital printing technologies and processes has reduced several of the traditional impacts of the printing industry, primarily by reducing or avoiding the use of many commonly-used inks, washes and coatings. Eco-Label criteria for lithography printing address several environmental impacts associated with pre-pres", printing and cleaning operations. Digital printing effectively bypasses and eliminates any impacts from this stage.

But there are still a range of chemicals used in toners for electro-photographic digital printing which have to be regulated by Eco-Label criteria.

Table 2: electro-photographic digital printing – chemicals [2]

Toner	Pigment such as carbon black, azo compounds, quinacridane, xanthrene, and phthalocyanines compounds. Bindings: thermoplastic resins as styrene-acrylate copolymers, and polyesters. Solvents: aliphatic hydrocarbon, light mineral oil. Additives: charge control agents such as sulfonic acids, carboxylic acids and their salts, complexed azo dyes, and highly acrylated phenazines, Cleaning additives such as aluminium or zinc stearate, and silicone oil.
Developers	Polyester resins, Copper-, zinc- and ferricoxide

Therefore toners and inks used for Eco-Labelled printed products must be free of substances which are classified with any of the following risk phrases in accordance with Directive

67/548/EC and its amendments: dangerous to environment (N), toxic (T), very toxic (T+), carcinogenic (T), mutagenic (T) or reprotoxic (T).

Toners and inks must not contain the heavy metals lead, cadmium, mercury and chromium with an oxidation stage 6 as constitutional components. Azo dyes which may release carcinogenic aromatic amines may also not be used. Furthermore toner shall give a negative result in the Ames test.

According to the Confederation of European Paper Industries (CEPI) 50% of the paper industry's raw material in Europe comes from recovered paper and board. Paper is the most recycled product in Europe. Bearing in mind that paper fibers could be recycled 4 to 6 times it is very important to provide high quality recovered paper grades to close the recycling loop as often as possible. Toners therefore have to be deinkable, to achieve the Austrian Eco-Label for electro-photographic digital printed paper products. As inks for inkjet printing are not proven to be deinkable by now, digital inkjet printing is not covered by Austrian Eco-Label criteria yet.

Toners, depending what they contain, can be hazardous waste or normal waste. Therefore toners or toner containers must be able to be reused or supplied to a material recycling scheme.

Emission to air might also be a topic to set Eco-Label criteria for digital printing. VOC is emitted from inkjet ink using solvents and when cleaning different parts of the machines. The emitted amount is low compared to other sources. As ink jet digital printing is not within the scope no criteria have been elaborated.

Emission of ozone is produced from coronas in electro-photographic digital printers. The emitted amount is low compared to other sources; therefore there are no requirements by now.

Certified printing companies

By now eight printing companies have been awarded with the Austrian Eco-Label. Two of them use certified electro-photographic digital printing technology; one of them uses NEXPRESS the other one XEROX DocuColor 5000.

Criteria for printed paper of other national or supranational Eco-Labelling systems in terms of recycability and deinkability

European Eco-Label

The flower is the symbol of the official Eco-Label of the European Union (EU). Draft criteria for printed paper, produced by any printing technology – lithographic (offset), flexography, rotogravure, screen and digital printing – have been elaborated.

There is a requirement which states that Eco-labelled products shall be recyclable and deinkable. According to "assessment and verification" of this criterion the applicant shall provide the test result of recyclability of a product containing wet strength agent or adhesives. Furthermore the deinkability of UV-curing inks or varnishes, where used, shall be proved. [3] There are no specific requirements according recycablility or deinkability for toners or inks.

An official criteria document has not been adopted by now, due to heavy lobbying by main publisher, paper and graphic industry associations against an Eco-Label for this product group.

Nordic Swan

The Nordic Swan is the official Eco-Label of the Nordic countries Sweden, Norway, Finland, Denmark and Iceland. Eco-Label criteria for lithographic (offset), flexography, rotogravure, screen and digital printing companies exist.

This product group has attracted over 400 company licences. It is the most successful ever Eco-Label product group in terms of licence numbers of the Nordic Swan. These licences are balanced between some major Scandinavian newspapers, many books and magazines as well as licences for stationary and catalogues. Examples include one of Norway's and one of Sweden's biggest newspapers [4].

To qualify for the Nordic Swan mandatory requirements have to be met and a certain number of points on the basis of the environmental performance have to be achieved, depending on the printing technology. Recycability and deinkability are not compulsory but very important. Significant number of points could be achieved if there is documentation that vegetable/water-based printing inks and varnishes (12 pts.), inks, wet or dry toners (7 pts.), other energy curable inks and varnishes (7 pts.) or adhesives (3 pts.) do not create problems in the recycling process. [5]

For digital printing a relatively high number of points must be achieved, so it seems nearly obligatory to use recycable and deinkable inks or toners to get the Nordic Swan.

Test methods for recycling must be the updated publications from the International Association of the Deinking Industry (INGEDE). Test methods shown by a competent and independent third party as giving equivalent results may also be used.

In order for the product to be considered reusable, the results for the tested parameters must be at least as good as the "orientation values" laid down by INGEDE [6], [7].

In the case of printing inks and varnishes, INGEDE 11 "Assessment of Print Product Recyclability - Deinkability Test" applies. Testing must be performed on 3 types of paper: uncoated, coated and surface-sized paper. If a type of printing ink is only sold for one or two specific types of paper, it is sufficient to test the paper type(s) in question.

INGEDE 12 "Assessing the Recyclability of Printed Products - Testing of Fragmentation Behaviour of Adhesive Applications" applies to adhesives [5].

Eco Mark of Japan

The Eco Mark program of the Japan Environment Association is managed according to ISO 14020 and ISO 14024 Type I, like all the other programs, which are described here. Concerning recycability Eco Mark Product Category No.120, "Paper Printed Matter", require that no materials defined as inhibitory substances for recycling waste shall be used. Inhibitory substances according to the criteria are for example: Hot -melt adhesive (excluding improved type o f EVA hot-melt adhesives), polyurethane hot-melt adhesives and water-soluble adhesive, UV ink, forming ink, gold/silver/pearl ink (excluding Eco Mark certified inks) [8].

The Japanese Eco Mark program has also developed Eco-Label criteria for offset lithographic inks (conventional, UV-curing, gold and silver), news inks, gravure inks and resin typographic inks. Toners or inks for digital printing are not covered. For recycling of printed matter using Eco-Labelled printing ink (except for gravure ink), environmental load in de-

inking shall not be greater than that of conventional printing inks. Particular consideration shall be given to de-inking of UV-cured offset lithographic printing ink. Its de-inking performance shall be equivalent to or greater than oil printing inks.

To prove conformity with the de-inking requirement, certificates of test results issued by a plant manufacturing recycled paper or by industrial test centres shall be submitted. For UV-cured offset lithographic printing ink, specified certificates stating that the printing ink has been designed giving consideration to de-inking characteristic and that it will not hinder the recycling of used paper shall be submitted. Prove of conformity shall be in the form of a document signed by the applicant, in addition to certificates of test results issued by two or more plants or industrial test centres [9]. There are no specific test methods required.

Eco Logo of Canada

EcoLogo is North America's most widely recognized and respected multi-attribute environmental certification mark. EcoLogo belongs to the Government of Canada. The EcoLogo program published 3 certification criteria documents for printing products and services - digital printing services, lithographic printing services and printing inks [10], [11], [12]. The latter include criteria for offset (sheetfed, heatsed web, coldset web), letterpress, water-based flexographic and water-based gravure printing inks. Even though problems with de-inking for example of water-based flexographic inks are known none of the mentioned criteria documents covers requirements concerning recycling or de-inking. One reason might be that criteria documents for lithographic printing services and printing inks have not been revised since more than 10 years.

Conclusions

Most of the important national Eco-Labelling systems have elaborated Eco-Label criteria for printed paper products or services. Digital printing, at least electro-photographic printing, is covered by each of these programs. Except for Canada all criteria require recycability or deinkability of printed paper resp. toners to certain extends, where some of them refer to defined test methods for verification. This shows that recycability and deinkability are, among others like release of hazardous substances and volatile organic compounds, important parameters for the environmental performance in the life cycle of a printed paper product.

Draft criteria for printed paper products of the most important supranational Eco-Labelling system, the European Eco-Label, are subject of heavy lobbying against Eco-Label criteria by the main publisher, paper and graphic industry associations. But EU Commission worked out an impact analysis which clearly concludes that an EU Eco-Label for printed paper products will have significant positive environmental and economic effects [4]. It is therefore to be expected that EU Eco-Label criteria will come into force soon.

The most important demand for environmental friendly printing services will come from green public procurement (GPP) and will significantly increase in the near future. By the end of 2006, 10 EU Member States have adopted draft national action plans for GPP and 10 more Member States are working towards it. The related technical procurement requirements in terms of environmental issues are mostly based on Eco-Label criteria.

The EU Member States decided in its renewed Sustainable Development Strategy to aim at achieving by 2010 an EU average level of Green Public Procurement equal to that currently achieved by the best performing Member States [13].

Public authorities are major consumers in Europe, spending some 16 % of the EU's gross domestic product (which is a sum equivalent to half the GDP of Germany) [14]. The success of Eco-Labelling for printing companies of the Nordic Swan and other national systems, the fact that EU Eco-Label criteria, which are similar to Nordic swan, will come into force soon on the one hand and the increasing demand for environmental friendly printing services by Green Public Procurement on the other hand will be a big environmental challenge for the conventional and the digital printing industry in the future.

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