

SLAVJANKA PEJČINOVSKA-ANDONOVA¹
DRAGICA CHAMOVSKA²

Professional paper
UDC:504.75.05:667.42

Eco-label criteria for “greener” indoor paints and varnishes

The process of establishing the national eco-labeling criteria for indoor paints and varnishes started with mapping the paints and varnishes producers, importers and exporters, type, content and quantities of produced and put on the market various paints and varnishes products. The technological scheme including the energy and material balance, the current quality control and environmental related testing in domestic laboratories were analyzed as well. The environmental impact assessment was performed for all phases of paints and varnishes life cycle: manufacturing (energy and water consumption, waste water, waste generation, hazardous waste generation), use of the product (waste water, air emissions) and end of life (packaging waste, air and water pollution).

Putting the national eco-label on paints for any producer means that the product has the following assets: a) limited Volatile Organic Compounds (VOC) and Volatile Aromatic Hydrocarbons (VAH), b) reduced sulphur emissions during production of titanium dioxide used as white pigment, c) reduced hazardous waste of by-products during titanium dioxide production, d) no use of heavy metals, e) user instructions for environmental use including storage conditions, proper waste management and cleaning of tools and last not a least a guarantee of minimum hiding power, wet scrub resistance, water resistance and adhesion.

Key words: Eco-label criteria for indoor paints and varnishes, Eco-label scheme, Environmental Impact Assessment, Life cycle analysis

INTRODUCTION

Across the world there are various voluntary eco-labeling schemes - EU Eco-label “Flower”, German scheme “Der Blaue Engel”, “Nordic Ecolabellina” established in the Nordic countries, “Green label” in Honk Kong, etc. with main aim to encourage businesses to market products and services that are environmental friendly [1-12]. Today these eco-label schemes cover a wide range of products and services like cleaning products, paper products, textile, paints and varnishes, home appliances and service such a tourist accommodation. Putting the eco-label on any product or service means that the product/service compliances with very strict ecological and performance criteria asking for less adverse environmental impacts over the whole product life cycle.

The national Eco - label scheme “Eco proizvod” has been established in Republic of Macedonia in 2005 as a voluntary activity in line with EU environmental approximation process and till now days a set of eco-label criteria has been established for several

group of products including the indoor paints and varnishes.

The aim of this paper is to present the process of setting the national eco-criteria for indoor paints and varnishes.

EXPERIMENTAL

The process of establishing the national eco-labeling criteria for indoor paints and varnishes started with mapping the paints and varnishes producers (AD OHIS, AD ADING and Alkaloid Premazi dooel), importers and exporters (more than 20 companies) in Republic of Macedonia, type, content and quantities of produced and put on the market various paints and varnishes products. The technological scheme including the energy and material balance, the current quality control and environmental related testing in domestic laboratories were analyzed as well. The national testing is mainly focused on the product quality through its performance characteristics: spreading rate, wet scrub resistance, resistance to water and adhesion. There is no practice for chemical parameters testing that are usually used as ecological criteria within the eco-labeling scheme across the world.

The environmental impact assessment was performed for all phases of paints and varnishes life cycle: manufacturing (energy and water consumption, waste water, waste generation, hazardous waste generation), use of the product (waste water, air emis-

Author's address: ¹Eko Mosaic, Consultancy within Engineering and Environmental Science, Skopje, Republic of Macedonia, ²SS Cyril and Methodius University, Faculty of Technology and Metallurgy, Skopje, Republic of Macedonia

Paper received: 20.05.2012.

sions) and end of life (packaging waste, air and water pollution).

The EIA Matrix was used as a tool identifying the type, nature, intensity, duration, scope, significance of the impacts based on the review of all collected data via questionnaires and interviews within these three

companies – paints producers. Two main set of indicators/benchmarks were used: a) average normative for usage of raw material per 1 kg final product; b) average emissions into water, air and generation of various type of waste.

The indicators are given in the Table 1.

Table 1 - Benchmarks for environmental impact assessment of paints production and distribution in R. Macedonia

Indicator	Benchmark for 1 kg final product	Total annual used resources for total production of indoor paints in Macedonia (average production of 3560 t or 3 297 000 l indoor paints for 2006/2007/2008)
Electricity	0.032 kWh	114 MWh
Water for technological process	0.1 m ³	356 000 m ³
Compressed air	1 m ³	3 560 000 m ³
		Generated emissions on annual basis
Waste water	0.2 l	712 000 l
Generation of waste	Different due to the type of waste	
Paper bags for paints packages	0.023 paper bags per 1 kg final product	81 880 paper bags
Unclear solvent – hazardous waste from machines cleaning	1.5-1.58 m ³	It has been recycled

RESULTS AND DISCUSSION

Based on these findings and taking into account other eco-labeling schemes with ecological and performance criteria already established for decorative paints and varnishes, the national set of eco-label criteria was adopted. The main aim of the criteria is:

Table 2 and they are focused on the limitation of the substances harmful for environment and health (white pigment content), reduction of air pollution,

a) Efficient use of products and waste minimization,

b) Mitigation of the environmental risks with special attention to the limitation of the VOC (volatile organic compounds), VAHs (volatile aromatic hydrocarbons) and dangerous substances,

c) Decreasing the water pollution risks.

The set of ecological criteria is given in reduction of by-products' hazardous wastes, limitation of air pollution by solvents VOC and VAHs) and limitation of the use of substances dangerous for the environment and health.

Table 2 - Ecological criteria for national eco-labeling of indoor paints and varnishes

ECOLOGICAL CRITERIA		
1.	Limitation of substances harmful for environment and health	White pigment content $\leq 38\text{g/m}^2$ of dry film (98% opacity)
2.	Reduction of air pollution	Sulphur emissions (expressed as SO ₂) in the production of titanium dioxide: SO _x < 300 mg/m ² of dry film (98% opacity)
3.	Reduction of by-products'	When white pigment is TiO ₂ (for dry film with 98% opacity):

ECOLOGICAL CRITERIA		
	hazardous wastes	Sulphates wastes < 20 g/m ² Chlorine wastes < 5 g/m ² for natural retile Chlorine wastes < 9 g/m ² for synthetic retile Chlorine wastes < 18 g/m ² for slag ores
4.	Limitation of air pollution by solvents	VOCs (Volatile Organic Compounds): Wall paints: ≤ 30 g/l (minus water) Other paints: (with a spreading rate ≥ 15 m ² /l at hiding power of 98% of opacity): ≤ 250 g/l (minus water) all other products: ≤ 180 g/l (minus water) VAHs (Volatile Aromatic Hydrocarbons): Wall paints ≤ 0.15% of product (m/m) all other products ≤ 0.04% of product (m/m)
5.	Limitation of the use of substances dangerous for the environment and health	The product shall not be classified as very toxic, toxic, dangerous to the environment, carcinogenic, toxic for reproduction or mutagenic in accordance with Directive 1999/45/EC Ingredients shall not contain: Heavy metals (or their compounds): Cd, Pb, Cr VI, Hg, As. Alkylphenolethoxylates (APEOs). Diethylene glycol methyl ether Substances (or preparations) classified as very toxic, toxic, carcinogenic, mutagenic, teratogenic, and toxic for reproduction. Limited content of dangerous substances: Active ingredients used as preservatives assigned the risk phrases R23, R24, R25, R26, R27, R28, R39 or R48 (or their combination): ≤ 0,1% (m/m) of the total paint formulation. Ingredients (substances or preparations) assigned risk phrases R50, R51, R52 or R53: ≤ 2,5% by mass of the product. Total sum of these substances (or preparations): ≤ 5% by mass of the product. Isothiazolinone compounds ≤ 500 ppm Mixture of 5 – chloro – 2 methyl-2H-Isothiazol-3-one and 2-methyl-2H-isothiazol-3-one ≤ 15ppm. Free formaldehyde ≤ 10 mg/kg.

CONCLUSIONS

Putting the national eco-label on paints for any producer means that the product has the following assets (the product is in compliance with ecological and performance eco-labeling criteria):

- a) Limited VOC and VAH,
- b) Reduced sulphur emissions during production of titanium dioxide used as white pigment,
- c) Reduced hazardous waste of by-products during titanium dioxide production,
- d) No use of heavy metals,
- e) User instructions for environmental use including storage conditions, proper waste management and cleaning of tools and last not a least a guarantee of minimum hiding power wet scrub resistance, water resistance and adhesion.

REFERENCES

- [1] Swan-labeling of Indoor paints and varnishes, Nordic Ecolabeling, 2006
- [2] EEB Evaluation of the European eco-label criteria and scheme, ECOEFF Consultant, 2004
- [3] Assessment of criteria development within the EU Eco-labeling scheme, dk-TEKNIK, Energy and Environment-Department of Environmental Impact Assessment
- [4] The Ecolabeling criteria based on the Life Cycle Inventory of eleven indoors decorative paints, Several Reports, 1994, 1998, 2003
- [5] Establishing the ecological criteria for the award of the Community ecolabel to indoor paints and varnishes, BIO INTELLIGENCE SERVICE, 2002

- [6] Eco labeling Fact sheets, EU Commission, 2008
- [7] S.Čakić,Č.Lačnjevac,M.Rajković,Lj.Rašković,J.Stamenković, Zaštita materijala, 52 (2011) 1, pp 43-49.
- [8] Organic Chemical Process Industry, Paints and varnishes, AP-42, CH 6, Mother of East LA, 1995
- [9] Inorganic Chemical Process Industry, Titanium Dioxide production, 2002
- [10] V. Alar, I. Stojanović, I. Mihalić, Zaštita materijala, 52 (2011) 3, pp 201-207.
- [11] Developing common core criteria for PAINTS, Thailand Environmental Institute, 2003
- [12] The Direct and Indirect benefits of the European Ecolabel-Final Report, AEAT, 2004.

IZVOD

EKO-OZNAKE ZA „ZELENIJIM” BOJAMA I LAKOVIMA

Proces uspostavljanja nacionalnih eko kriterijuma za boje i lakove počeo je mapiranjem proizvođača, uvoznika i izvoznika, vrsta, sadržaja i količina proizvedenih i stavljenih na tržište raznih boja i lakova. Tehnološke šeme, uključujući energetske i materijalne bilance, tekuće kontrole kvaliteta i zaštite životne sredine u vezi sa testiranjem u domaćim laboratorijama su ocenjeni kao dobri. Uticaj na životnu sredinu urađen je za sve faze životnog ciklusa boja i lakova: proizvodnja (potrošnja energije i vode, otpadne vode, opasnog otpada), upotreba proizvoda (otpadne vode, emisije u vazduhu) i kraj života (ambalažni otpad, zagađenje vazduha i vode).

Stavljanje nacionalne eko-oznake za boje za svakog proizvođača znači da proizvod ima sledeća svojstva: a) ograničeno isparljiva organska jedinjenja (VOC) i isparljive aromatične ugljovodonike (VAH); b) smanjenje sumpornih gasova tokom proizvodnje titanijum dioksida, upotrebljenog kao bela pigmenta; c) smanjenje opasnog otpada proizvoda tokom proizvodnje titan-dioksida; d) ne koristi teške metale; e) korisnička uputstva za upotrebu i čuvanje životne sredine, uključujući uslove čuvanja, pravilno upravljanje otpadom i čišćenje alata.

Ključne reči: *Eko-oznaka kriterijuma za boje i lakove, Eko-etikete tehnološke šeme, procena uticaja životnog ciklusa*

Stručni rad

Rad primljen: 20.05.2012.