



Appendix A

Eco-product Certification Scheme

Product Criteria for Construction Materials

Coatings: Paint Products (ECS-CM-001-001:2008)

ECS-CM	Construction Materials
ECS-CM-001	Coatings
ECS-CM-001-001	Paint Products

1. General Background

The Eco-product Certification Scheme (ECS) is an independent and voluntary scheme which strives to identify and distinguish products that are, based upon full life cycle considerations, environmentally preferable to comparable products with the same function. The Scheme is managed and delivered by the Green Council (GC) with contributions from the ECS Certification Advisory Committee and a number of supporting organizations.

The prime objectives of the ECS are:

- (i) For Consumers: assist in identification, selection and purchasing of products that are less harmful to the environment; and
- (ii) For Industry: stimulate consideration and production of, and contribute to the distinguishing and marketing of environmentally preferable alternatives.

This Product Environmental Criteria document (herein after “Product Criteria”) sets out the requirements that a paint product must satisfy in order for the product to be certified and its producer/marketer to be licensed to use the ECS label. The requirements include product specifications and environmental criteria. The document also identifies the specific testing and other means to be used to verify conformance.

2. Background – Paint Products

Paint products are manufactured from a wide range of organic and inorganic materials. Conventional products contain colorant, binding agents, solvents, heavy metals, toxins and/or volatile organic compounds (VOCs) that can lead to a wide range of environmental contamination and pollution and/or indoor air quality problems with negative health impacts. From a product life cycle perspective, the most significant adverse environmental impacts relate to the inclusion and release of solvents, heavy



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metals and other toxic substances during manufacturing and use. While alternatives for the use of heavy metals (which can enter the human and animal food chains through production facility discharges into rivers and estuaries) can be and are being adopted, the production of highly dangerous substances (e.g. halogens, sulphuric acid, heavy metals, chlorinated hydrocarbons, etc.) along with their environmentally harmful by-products remains. Further, considerable energy consumption is involved in the production of these products. Another concern is that these products pose a significant health and environmental risk when improperly disposed of or when subjected to fire.

Another adverse environmental aspect of many conventional paint products is the incorporation of synthetic solvents that are mainly derived from petrochemicals. These solvents don't break down easily in the natural environment. Also, the associated manufacturing processes cause air pollution and byproduct wastes are generally non-degradable and can be highly toxic.

Apart from being the leading source of indoor air pollution (which is one of the top five human health hazards), the various chemical components in the paint are often released into the environment after disposal. Volatile organic compounds – "VOCs" -- are used by many paint manufacturers as solvents which evaporate very readily and enter human respiratory systems through the breathing in of any off-gassing fumes. VOCs also rise into the atmosphere and form smog which contains secondary pollutants like ozone and peroxyacetyl nitrate. In addition, hazardous additives such as formaldehyde and tributyltin (TBT) are also added to paint products in order to prevent the growth of mould.

Due to the major potential adverse environmental impacts of paint products, the components and inputs should be carefully considered and selected in order to avoid or minimize harmful effects on human health and the environment. The entire product life cycle, including inputs/chemical components, production processes, applications, and disposal options, should be considered and properly addressed.



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3. Scope

The Product Criteria in this document apply to paints, stains and varnishes (hereinafter referred to as “paints”) in organic and inorganic liquid, paste or powder, which form an opaque, continuous film after application to decorate or protect surfaces, as well as to conceal surface irregularities and perform specific technical functions to the surface of a substrate.

The three main aims of the Product Criteria are to:

- (i) promote and guide less use of environmentally damaging organic solvents and discourage their continued harmful release into the atmosphere;
- (ii) reduce the selection and use of toxic components which can quite adversely impact upon human health and the environment at different stages of the product life cycle; and
- (iii) guide the reduction of waste production through requiring less primary packaging and promoting reusability and/or recyclability.

4. Justification

In establishing the Product Criteria, the ECS draws from relevant international standards and is benchmarked with well-developed eco-labels managed by the members of the Global Ecolabelling Network (GEN) to ensure credibility of the Product Criteria. The Certification Advisory Committee composed of members from the academia, industrial and commercial associations, universities, laboratories and environmental groups, oversee the policy and operation of the ECS.

As with the majority of eco-labelling programs, the ECS is an ISO (International Organization for Standardization) 14020 14024 Type 1 label, which involves a third-party certification requiring considerations of life cycle impacts. Some of the key Product Criteria also require compliance with the legal requirements stated by the Hong Kong Special Administrative Region (HKSAR).



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5. Definitions

“ASTM” refers to the American Society for Testing and Materials.

“Halogenated hydrocarbons” refer to any hydrocarbons incorporating halogen elements including fluorine, chlorine, bromine and iodine.

“ISO” refers to the International Organization for Standardization.

“Paint” means a pigmented liquid that is designed for application in single or multiple layers, forming an opaque and continuous film having protective, decorative or specific technical properties when applied to a substrate.

“Solvent-based paints” refer to paints using organic compounds as a solvent [in contrast to water-based paints].

“Stain” refers to a transparent, semi-transparent or opaque mixture of colouring matter (dyes and/or pigments) intended to colour and/or protect a surface by penetration, leaving practically no surface film.

“Varnish” refers to a liquid composition that is converted to a transparent or translucent, continuous film after application.

“VOCs” (volatile organic compounds) means any volatile compound of carbon, with a boiling point of 250 °C or lower under a pressure of 101.3 kPa, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides, metallic carbonates, ammonium carbonate and exempt compounds as stated in part 2, Schedule 3 of Cap 311W Air Pollution Control (Volatile Organic Compounds) Regulation.

“VOCs content” refers to the mass of VOCs in paints, expressed in grams per litre, and measured through adding solvent with the maximum dilution ratio indicated on the user’s manual for a specific product.

“VOCs emissions” refers to the mass of VOCs emitted from a product area over a certain period of time under specific test conditions [refer to the table in Section 4



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for identification of the specific verification/test methods to be applied]. It includes n-hexane and n-hexadecane of the chromatogram analyzed by gas-chromatograph equipped with a mass spectrometric detector.

“Water-based paints” refer to paints using water as a solvent or dispersing agent.

6. Product Environmental Criteria

The table below sets out the Product Environmental Criteria for the product category of Paint Products (ECS-CM-001-001):

Product Environmental Criteria	Verification Method(s)
1. For water-based coatings, the paint shall not contain volatile organic compounds (VOCs) in excess of 50 g per litre of paint. For solvent-based coatings, the paint shall not contain VOCs in excess of 250 g per litre of paint.	ASTM D3960 [Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings], or any relevant national or international test method pertinent for the test parameter
2. The paint shall contain no more than 1.0% by wet weight or 10g/L of the halogenated solvents (including DCM and 1,1,1-Trichloroethane).	ASTM D4457 [Test Method for Determination of Dichloromethane and 1,1,1-Trichloroethane in Paints and Coatings by Direct Injection into a Gas Chromatograph], or any relevant national or international test method pertinent for the test parameter
3. The paint shall not be formulated or manufactured with mercury or their compounds, or be tinted with pigment of cadmium, chromium VI or lead. The levels of the above hazardous elements as impurities shall not exceed 100 parts per million (ppm) for cadmium, 200 ppm for chromium VI, lead and mercury.	<p><u>Cadmium and Lead</u> (ASTM D3335) [Standard Test Method for Low Concentrations of Lead, Cadmium, and Cobalt in Paint by Atomic Absorption Spectroscopy], or any relevant national or international test method pertinent for the test parameter</p> <p><u>Chromium (VI)</u> (ISO 3856-5) [Determination of hexavalent chromium content of the pigment portion</p>



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<p>4. The paint shall contain no more than 0.1% by wet weight of formaldehyde.</p> <p>5. The paint shall contain no more than 1.0% by wet weight of the sum total of aromatic compounds.</p> <p>6. General packaging requirements <u>Packaging Material using Recycled Paper</u> Applicable to packaging paper, paper bag, paper box, paper board and pulp derived products. a. The recycled content of the packaging paper and paper bag should be at least 40%. Paper box, board and plate should be of 100% recycled content. b. The source of raw material, country of origin and recycled content ratio should be clearly stated.</p> <p><u>Packaging Material using Plastics</u> Applicable to non-food products plastic packaging. (a) The product shall not contain lead, cadmium,</p>	<p>of the liquid paint or the paint in powder form - Diphenylcarbazide spectrophotometric method], or any relevant national or international test method pertinent for the test parameter</p> <p><u>Mercury</u> (ASTM D3624) [Standard Test Method for Low Concentrations of Mercury in Paint by Atomic Absorption Spectroscopy], or any relevant national or international test method pertinent for the test parameter</p> <p>ASTM D6191 [Test Method for Measurement of Evolved Formaldehyde from Water Reducible Air-Dry Coatings], or any relevant national or international test method pertinent for the test parameter</p> <p>ASTM D3257 [Test Methods for Aromatics in Mineral Spirits by Gas Chromatography], or any relevant national or international test method pertinent for the test parameter</p> <p>Review of supporting information as required by the Green Council officials</p> <p>Review of supporting information as required by the Green Council officials</p> <p>Analytical testing and review of supporting</p>
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7. Product Sampling

- 7.1 An Auditor shall take two 1000 millilitres (mL) samples for each product (which is packed and ready for sale) and store them in specified containers during his/her On-site Audit / Annual Surveillance Audit. The Auditor shall complete the Sample's Chain of Custody Record From: Paint Products (F014). The selected samples will be sealed and together with the completed F014 will be delivered to and tested by a Hong Kong Laboratory Accreditation Scheme (HOKLAS) Accredited Laboratory (or equivalent) as agreed in advance by the Applicant and the Green Council officials.
- 7.2 Random samples shall be selected and secured by the Auditor from products with the (1) black / darkest colour, (2) pure white / palest colour, and (3) yellow / orange colour, for laboratory tests during On-site Audit / Annual Surveillance Audit to confirm compliance to the Product Environmental Criteria. Only tests on hazardous elements (Item 3) will be carried out for different colours of each product.
- 7.3 Results of the Tests conducted by the HOKLAS-accredited laboratory(ies) can be readily accepted by the Green Council.
- 7.4 Results of Tests produced by other laboratories may be regarded as equivalent (e.g. Laboratories accredited by the Mutual Recognition Arrangement (MRA) partners of the HKAS). However, such laboratories shall be evaluated and monitored in accordance with the Procedure for Approved Laboratories Registration (QSP-007).
- 7.5 The Licensed Product(s) will be purchased from the local market by the Green Council officials and sent to the Approved Testing Laboratory(s) for testing in accordance with the Procedure for Product Surveillance in the Market (QSP-004).



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8. List of Environmental Standards for Benchmarking

- Commission of the European Communities (2002) Commission Decision of 3 September 2002 establishing revised ecological criteria for the award of the Community eco-label to indoor paints and varnishes and amending Decision 1999/10/EC (notified under document number C(2002)3202) (Text with EEA relevance) (2002/739/EC). Official Journal of the European Communities. p.L236/4-9. Retrieved from http://ec.europa.eu/environment/ecolabel/product/pg_indoorpaints_en.htm#revision on 29 May 2008.
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Singapore Environment Council (2003) Product Qualifying Criteria – Paints and Surface Coatings (9th Batch). Green Label, Singapore, Date of release: 16 June 2003. Retrieved from http://www.sec.org.sg/greenlabel_hm/greenlable_frameset.htm on 29 May 2008.

TerraChoice (2005) CCD-047 Architectural Surface Coatings. EcoLogo^{CM} Program Certification Criteria Document, 9pp. Retrieved from <http://www.ecologo.org/common/assets/criterias/CCD-047.pdf> on 29 May 2008.



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Summary Table for Environmental Standards for Benchmarking

Environmental Standards	VOCs (g/L)		Halogenated Solvent (1% = 10g/L)	Hazardous Elements	Formaldehyde	Aromatic Compounds
	Water-based	Solvent-based				
International Benchmark						
Commission of the European Communities (2002) & European Eco-label (2008)	30	250	N/A	0	0.001% by weight	0.15%-0.4%
Korea Eco-products Institute (2005)	50	450	0	1000 ppm (total)	0.00012% by weight	1% by weight
Nordic Ecolabelling (2006)	30	250	N/A	0	0.001% by weight	0.15%-0.4% by weight
TerraChoice (2005)	50-250		0	0	0	0
Green Seal (2008)	50-250		N/A	100 ppm (total)	0	0.5% by weight
Green Mark (2007) oil-based paints		380	5% by weight	1000 ppm (total)	5% by weight	5% by weight
Green Mark (2007) water-based paints	50-100		0.1-1% by weight	1000 ppm (total)	0.1-1% by weight	0.1-1% by weight
New Zealand Ecolabelling Trust (2008)	50-100		0.1% by weight	1000 ppm (total)	0.1% by weight	0.1% by weight
Eco Mark (2007)	1-50	200	0.1%-1% by weight	1000 ppm (total)	0	0.1%-1% by weight
Singapore Environment Council (2003)	50-75	200-300	0	0	0	0
ECS (2008)	50	250	1% by weight or 10g/L	100 ppm for Cd, 200 ppm for Cr (VI), 200 ppm for Pb and 200 ppm for Hg	0.1% by weight	1% by weight or 10g/L