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|  Green Mark | Inks | No. 90 |
| | | Category No. A-07 |
| 1. Scope <p>This standard is applicable to water-based inks, vegetable oil-based inks, solvent-based inks and UV-curable inks (UV inks).</p> 2. Terms and definitions <p>For the purpose of this standard, the following terms and definitions shall apply.</p> <p>(1) Halogenated solvents: Solvents which contain halogen component(s), include 1,1,1,2-tetrachloroethane, 1,1,1-trichloroethane, 1,1,2-trichloroethane, 1,1-dichloroethene, 1,1-dichloroethane, 1,1-dichloropropene, ethylene dibromide, 1,2-dichloroethane, 1,2-dichloropropane, 1,3-dichloropropane, 2,2-dichloropropane, chlorobromomethane, dichlorobromomethane, methyl bromide, carbon tetrachloride, chlorobenzene, chloroethane, chloroform, chloromethane, <i>cis</i>-1,2-dichloroethene, <i>cis</i> -1,3- dichloropropene, dibromochloromethane, dibromomethane, dichlorodifluoromethane, dichloromethane, tetrachloroethylene, <i>trans</i>-1,2- dichloroethene, <i>trans</i> -1,3-dichloropropene, trichloroethene, fluorotrichloromethane, methyl iodide, ethyl iodide, 1-iodopropane, 1-iodobutane, vinyl chloride, chlorodifluoromethane, and dichloromonofluoromethane.</p> <p>(2) Phthalate esters (PAEs): Include di(2-ethylhexyl) phthalate (DEHP), di-n-octyl phthalate (DNOP), dimethyl phthalate (DMP), dibutyl phthalate (DBP), benzyl butyl phthalate (BBP), di-isononyl phthalate (DINP), di-isodecyl phthalate (DIDP), and diethyl phthalate (DEP).</p> <p>(3) Azo dyes: Include p-aminodiphenyl, benzidine, p-chloro-o-toluidine, 2-naphthylamine, o-amino-azotoluene, 2-amino-4-nitrotoluene, 4-chloroaniline, 2,4-diaminoanisole, 4,4'-methylenedianiline, 3,3'-dichlorobenzidine, 3,3'-dimethoxybenzidine, 3,3'-dimethylbenzidine,</p> | | |
| Date of Promulgation: October 17, 2005 | Ministry of Environment | Date of Revision: January 25, 2017 |

3,3'-dimethyl-4,4'-diaminodiphenylmethane, P-cresidine, 4,4'-methylene-bis(2-chloroaniline), 4,4'-oxydianiline, 4,4'-thiodianiline, o-toluidine, m-toluylenediamine, 2,4,5-trimethylaniline, o-anisidine, 4-aminoazobenzene, 2,4-xylidine, and 2,6-xylidine.

(4) Total polycyclic aromatic hydrocarbons (TPAHs): The sum of the following 18 polycyclic aromatic hydrocarbon compounds: naphthalene, acenaphthylene, acenaphthene, fluorine, phenanthrene, anthracene, fluoranthene, pyrene, chrysene, benzo[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[a]pyrene, dibenzo[a,h]anthracene, indeno[1,2,3-cd]pyrene, benzo[g,h,i]perylene, benzo[j]fluoranthene, and benzo[e]pyrene.

3. Product characteristics

- 3.1 The ink shall not contain mercury, lead, cadmium, hexavalent chromium, arsenic, antimony, barium, selenium, triphenyltin, tributyltin, formaldehyde, halogenated solvents and phthalates, and their measured contents shall comply with the regulatory limits. For color inks, besides meeting the above requirements, the content of azo dyes shall comply with the regulatory limit.
- 3.2 The ink's content of total polycyclic aromatic hydrocarbons (TPAHs) shall comply with the regulatory limits.
- 3.3 The ink's content of total volatile organic compounds (VOCs, with boiling points below 250°C under 1 atmospheric pressure) shall comply with the regulatory limits.
- 3.4 The product or its manufacturing processes shall not use substances stipulated by the Taiwan EPA as toxic substances, or substances controlled by the Montreal Protocol.

4. Container Materials

When a metal container is used for the ink, the lead content of the container and the container's lid/cover/cap shall comply with the regulatory limit. The ink product or product packaging shall meet the requirements of ISO 11469, in labeling all major plastic components weighing more than 25 g in prominent areas to indicate the composition code.

5. Test methods and regulatory limits

The regulated substances and regulatory limits for this standard are listed below.

The applicable test methods shall be the national, international or specific industry standard methods, and the test reports shall be issued by accredited professional testing organizations.

| Applicable Content | Regulated Substance | Regulatory Limit | Referenced Test Method |
|--------------------|----------------------|------------------|--|
| Ink | mercury | < 2 mg/kg* | NIEA M317 NIEA M318 US EPA 7471 US EPA 7473 US EPA 3052 |
| Ink | lead | < 2 mg/kg | NIEA M353 NIEA M301 US EPA 3051 US EPA 3050 US EPA 3052 |
| Ink | cadmium | < 2 mg/kg | NIEA M353 NIEA M301 CNS 15050 US EPA 3051 US EPA 3050 US EPA 3052 |
| Ink | hexavalent chromium | < 3 mg/kg* | NIEA T303 US EPA 3060 US EPA 7196 |
| Ink | arsenic | < 3 mg/kg* | US EPA 3051A US EPA 3050B US EPA 3052 |
| Ink | antimony | < 5 mg/kg* | US EPA 3051A US EPA 3050B US EPA 3052 |
| Ink | barium | < 2 mg/kg | US EPA 3050B |
| Ink | selenium | < 2 mg/kg | NIEA W341 |
| Ink | triphenyltin | < 2 mg/kg | NIEA T504 CNS 13105 |
| Ink | tributyltin | < 2 mg/kg | NIEA T504 CNS 13105 |
| Ink | formaldehyde | < 5 mg/kg | NIEA R502 |
| Ink | halogenated solvents | < 15 mg/kg* | US EPA 8260 US EPA 5021 |
| Ink | phthalates | < 10 mg/kg* | NIEA T801 NIEA M731 US EPA 3550C CNS 15138-1 |
| Ink | azo dyes | < 5 mg/kg* | LFGB B 82.02-2 EN 14362-1 |

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|-----------------|--|---|--|
| Ink | total polycyclic aromatic hydrocarbons (TPAHs) | water-based inks & UV-inks: < 1% vegetable oil-based inks & solvent-based inks: < 5% | NIEA R812 CNS 13105 US EPA 8270D |
| Ink | volatile organic compounds (VOC) | water-based inks:< 5%; vegetable oil-based inks: <4%; UV-inks: < 2%; solvent-based inks: <50% | NIEA M735 US EPA 5021 |
| Metal container | lead | < 3 mg/kg* | NIEA M353 US EPA 3050B |

*: The test report shall provide evidence that the employed test methods have detection limits of less than 1/3 of regulatory limits.

6. Packaging

The materials of the product packaging shall meet the requirement of the “Guidelines on Review of Applications for Qualified Environmental Protection Products”.

7. Labeling

7.1 The name, address and consumer hotline of the Green Mark user shall be clearly printed on the product or its packaging.

7.2 The product packaging or user instructions shall include information regarding the end-of-life treatment of ink and ink container.

7.3 The product packaging shall bear a label reading “Low Pollution”.

8. Other requirements

For inks with the same formulations, they are considered the same products if there is only difference in packaging size; and they are considered different products, if the ink color is different.

Revision History:

First revision: January 25, 2017