Indoor Decorating and Refurbishing Materials -
Limit of Harmful Substances of Solvent Coatings for Woodenware

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Issued by General Administration of Quality Supervision, Inspection and Quarantine of the People’s Republic of China
Foreword

Provisions of Chapter 3 in this Standard are mandatory and others are voluntary.

Limit of benzene in this Standard refers to Ecological Criteria for the Award of the Community Eco-Label to Indoor Paints and Varnishes (1999/10/EC), and limit of soluble heavy metal refers to the requirements of toxic heavy metals in children’s toy materials made by the U.K., Germany, France and Economic Commission for Europe (BS 5665:1989, EN 71:1989, EN 71-3, EN 71:1988).

Annex A and Annex B of this Standard are normative.

Products of manufacturing enterprises shall meet this national standard with a transition period of 6 months from 1 January, 2002; and products which fail to meet this national standard shall not be sold in the markets from 1 July, 2002.

This Standard was proposed by China Petroleum and Chemical Industry Association.

This Standard is under the jurisdiction of National Technical Committee of Paint and Pigments for Standardization.

This Standard was drafted by Changzhou Paint and Coatings Chemical Industry Research Institute, China National Chemical Construction Corporation, Institute of Environmental Health Monitoring, Chinese Academy of Preventive Medicine, Shanghai Coatings Co., Ltd., Shanghai Research Institute of Paint & Coatings, Zhonghua Chemical Industry Institute of Standardization, and China Academy of Building Research.


The mainauthors of this Standard are Zhang Junzhi, Zhao Ling, Feng Shifang, Qi Qiping, Wu Guolin, Xu Dongqun, Wang Daozhang, Mei Jian and Xiong Wei.

This Standard is issued on December 10, 2001 for the first time.

This Standard is interpreted by National Technical Committee of Paint and Pigments for Standardization.
Indoor Decorating and Refurbishing Materials -

Limit of Harmful Substances of Solvent Coatings for Woodenware

1. Scope

This Standard specifies technical requirements, test methods, inspection rules, packaging marks, safety painting, protection, etc. for acceptable limits of substances in coatings for woodenware which are harmful to human health such as nitrocellulose paints, polyurethane paints and alkyd paints.

This Standard is applicable to indoor decorating and refurbishing solvent coatings for woodenware¹), and can be used as reference for indoor decorating and refurbishing solvent coatings of other resin types and for other uses.

This Standard is not applicable to waterborne coatings for woodenware.

2. Normative References

The following normative documents contain provision which, through reference in this text, constitute provisions of this national standard. For dated reference, subsequent amendments (excluding correction of error) to, or revisions of, any of these publications do not apply. However, parties to agreements based on this national standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies.

<table>
<thead>
<tr>
<th>GB/T 1250 1989</th>
<th>Rules for expression and judgment of limiting values</th>
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<tr>
<td>GB/T 6750 - 1986</td>
<td>Paints and varnishes - Determination of density (eqv ISO 2811:1974)</td>
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<td>GB/T 9750-1988</td>
<td>Marks for package of coating products</td>
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| GB/T 9758.4 - 1988   | Paints and varnishes- Determination of soluble metal content - Part 4: Determination of cadmium content - Flame atomic absorption spectrometric method and

¹) Coatings for woodenware with organic substances as solvent.
polarographic method (idt ISO 3856-4:1984)


GB/T 9758.7 - 1988 Paints and varnishes-Determination of soluble metal content-Part 7: Determination of mercury content of the pigment portion of the paint and the liquid portion of water-dilutable paints - Flameless atomic absorption spectrometric method (idt ISO 3856-7:1984)

GB/T 18446 - 2001 Standard test method for unreacted toluene diisocyanates (TDI) in urethane prepolymers and coatings solution by gas chromatography

3. Requirements

Products shall meet the technical requirements in Table 1.

Table 1 Technical requirements

<table>
<thead>
<tr>
<th>Items</th>
<th>Limits</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Nitrocellulose paints</td>
</tr>
<tr>
<td>Volatile organic compound (VOC)(^a), (g/L)</td>
<td>≤750</td>
</tr>
<tr>
<td></td>
<td>Luster (60°) ≥80, 600</td>
</tr>
<tr>
<td>Benzene(^b), %</td>
<td>≤0.5</td>
</tr>
<tr>
<td>Sum total of toluene and xylene(^b), %</td>
<td>≤45</td>
</tr>
<tr>
<td>Free toluene diisocyanate (TDI)(^c), %</td>
<td>-</td>
</tr>
<tr>
<td>Heavy metals (pigmented paints only), (mg/kg)</td>
<td>Soluble lead</td>
</tr>
<tr>
<td></td>
<td>Soluble cadmium</td>
</tr>
<tr>
<td></td>
<td>Soluble chromium</td>
</tr>
<tr>
<td></td>
<td>Soluble mercury</td>
</tr>
</tbody>
</table>

\(^a\) The content of volatile organic compound is determined after mixing at the specified mixing ratio and dilution ratio of products. In case that consumption of diluent is within a certain range, it shall be determined after being diluted with the recommended maximum dilution factor.

\(^b\) In case dilution ratio for products is specified or products consist of two or more components, content of benzene in diluent and various components shall be determined respectively, and then the total content of benzene in the mixed coating shall be calculated as per the specified mixing ratio of products. In case the amount of diluent used is within a certain range, it shall be calculated as per the
recommended maximum dilution ratio.

In case dilution ratio of polyurethane paints is specified or paints consist of two or more components, content of free toluene diisocyanate in curing agent (containing toluene diisocyanate prepolymer) shall be first determined and then content of toluene diisocyanate in the mixed coating shall be calculated as per the specified mixing ratio of products. In case the amount of diluent used is within a certain range, it shall be calculated as per recommended minimum dilution ratio.

4. Test methods

4.1 Sampling

Follow the procedures specified in GB 3186 - 1982(1989) to sample products. Divide samples into two shares; one is stored hermetically and the other is taken as samples for inspection.

4.2 Determination of volatile organic compound (VOC)

4.2.1 Mix samples evenly, and then follow GB/T 6751 - 1986 to determine mass fraction (V) of volatile organic compound in coating. Test conditions are as follows: (105 ± 2) °C, for 3 h.

4.2.2 Mix samples evenly, and then follow GB/T 6750 - 1986 to determine density of coating (ρ) at test temperature of (23 ± 2) °C.

4.2.3 Calculate content of volatile organic compound according to the following formula:

\[ \text{VOC} = V \times \rho \times 10^3 \]

where:

\( V \) - mass fraction of volatile organic compound in coating;
\( \rho \) - density of coating at temperature of (23 ± 2) °C, (g/mL).

4.3 Follow Annex A to determine benzene.

4.4 Follow Annex A to determine toluene and xylene.

4.5 Follow GB/T 18446 - 2001 to determine free toluene diisocyanate (TDI). Methyl polysiloxane can also be selected as stationary liquid (SE-30). For samples decomposable below 150 °C, it is preferred to select the optimal temperature at which samples can be fully vaporized but not be decomposed.

4.6 Follow Annex B to determine heavy metals (soluble lead, soluble cadmium, soluble chromium and soluble mercury).

5. Inspection rules
5.1 All technical contents contained in this Standard are type inspection items.

5.1.1 Under normal production condition, type inspection shall be carried out at least once every year.

5.1.2 Type inspection shall be carried out at any time in any of the following cases:
   - Initial typing of new products
   - Products are produced in non-local places
   - Production formula, process and raw materials have major changes
   - Production restarts after three months’ suspension.

5.2 Judgment of inspection results

5.2.1 Judge inspection results by round-off comparison method in GB/T 1250 - 1989.

5.2.2 When inspection results of all items reach requirements of this Standard, the products shall be judged satisfactory to this Standard. In case inspection result of one item fails to reach requirements of this Standard, stored samples shall be reinspected. In case the reinspection result fails to reach requirements of this Standard yet, the products shall be judged unsatisfactory to this Standard.

6. Packaging marks

6.1 Packaging marks of products shall be in conformity to provisions of GB/T 9750 - 1998. In addition, product judged qualified by inspection according to this Standard can be clearly indicated on packaging mark.

6.2 For coatings consisting of two or more proportioned components, packaging mark shall clearly indicate mixing ratio of various components. For coatings to be diluted for construction, packaging mark shall clearly indicate dilution ratio.

7. Safety painting and protection

7.1 Painting shall be performed with good indoor ventilation and away from sources of ignition.

7.2 Brush painting is preferred.

7.3 Constructors shall wear necessary protective articles in painting.

7.4 Good indoor ventilation shall be maintained after completion of painting.

7.5 The painted rooms shall be kept vacant for some time before use.