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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB 46997-2025

Limits of certain heavy metal in printing ink

油墨中重金属的限量

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1 Scope

GB 46997-2025 is the Chinese national standard on limits of certain heavy metal in printing ink, in the field of paint and colour industries. It carries no /T suffix, which in the Chinese system means compliance is mandatory: a product or a practice within its scope has to meet it to be lawfully made, sold or carried out in China. It was issued on 31 December 2025 by the State Administration for Market Regulation; Standardization Administration of China, and takes effect on 1 January 2027. Classification: ICS 87.080, CCS Y44. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This document specifies the maximum limit requirements for lead, cadmium, mercury, hexavalent chromium, and soluble heavy metals (soluble antimony, soluble arsenic, soluble barium, soluble cadmium, soluble chromium, soluble lead, soluble mercury, and soluble selenium) in printing inks. It also describes the test methods. This document applies to printing ink products.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 6682, Water for analytical laboratory use -- Specification and test methods

3 Terms and definitions

This document contains no terms or definitions requiring definition.

4 General

This document aims to protect human health to the greatest extent possible, minimize environmental pollution and damage, and ensure that the safety or health of users or third parties is not compromised.

5 Requirements

The maximum limits for heavy metals in printing ink shall comply with the requirements of Table 1.

6 Inspection methods

6.1 Inspection methods for lead, cadmium, mercury, and hexavalent chromium in printing ink

6.1.1 Sample preparation

6.1.1.1 Reagents and materials Unless otherwise specified, only the confirmed analytically-pure reagents or higher, and distilled water, deionized water, or water of equivalent purity, shall be used in the analysis. 6.1.1.1.1 Nitric acid (HNO3). guaranteed reagent. 6.1.1.1.2 Hydrogen peroxide (H2O2). approximately 30% (mass fraction), analytically pure. 6.1.1.1.3 Hydrofluoric acid (HF). guaranteed reagent. 6.1.1.1.4 Nitric acid solution (1+1) (volume ratio). 6.1.1.1.5 Water. meets, at a minimum, the requirements for Grade 2 water as specified in GB/T 6682.

6.1.1.2 Instruments and equipment 6.1.1.2.1 Drying oven. 0°C~200°C; temperature control accuracy at ±2°C. 6.1.1.2.2 Pressure digestion vessel. equipped with a polytetrafluoroethylene (PTFE) inner digestion vessel. 6.1.1.2.3 Microwave digestion system. equipped with polytetrafluoroethylene (PTFE) digestion inner vessels. 6.1.1.2.4 Hot plate (for acid wet digestion method) or muffle furnace (for ashing method). 6.1.1.2.5 UV curing unit 6.1.1.2.6 Analytical balance. accuracy is

0.1 mg. 6.1.1.2.7 Volumetric flasks (25 mL, 50 mL, etc.). 6.1.1.2.8 All glassware, glass containers, glass plates, or PTFE plates shall be soaked in a nitric acid solution (1+1) for 24 h prior to use. They shall then be washed with water and dried.

6.1.1.3 Sampling procedure for test specimens After thoroughly mixing the test specimen, prepare a coating film of appropriate thickness on a glass plate or a polytetrafluoroethylene (PTFE) plate. Once completely dry [if oven-drying is required, the temperature shall be (60

± 2)°C; alternatively, the printing ink shall be dried in accordance with its specific drying characteristics], collect the printing ink sample. Pulverize the sample at room temperature, then sieve it through a

0.5 mm x

0.5 mm metal sieve. Set it aside for further processing. NOTE. If the coating film cannot be easily pulverized into

0.5 mm x

0.5 mm pieces, prepare the sample in dimensions of no less than 1 mm x 1 mm but no greater than 2 mm x 2 mm, and then proceed with the test.

6.1.1.4 Digested specimen 6.1.1.4.1 Pressure vessel digestion method Weigh

0.5 g of the specimen (accurate to

0.1 mg) and place it into a PTFE digestion liner. Add 5~8 mL of nitric acid and 2 mL of 30% hydrogen peroxide. For materials with a high silica content, an additional 3 mL of hydrofluoric acid must be added. Alternatively, depending on the sample matrix, select an appropriate sample mass and acid addition method to ensure complete digestion of the sample. Cover with the PTFE lid, then tighten the stainless-steel outer jacket. Place the assembly in a constant- temperature drying oven and heat at (180 ± 2)°C for 4 h. Once the pressure digestion vessel has cooled to room temperature, transfer the digest solution into a 50 mL volumetric flask. Rinse the PTFE liner and lid 3~4 times with water, and transfer the rinsings into the volumetric flask. Dilute to the mark with water. If the solution is not clear or if a precipitate forms, filter the solution and retain the digested specimen solution for subsequent analysis. 6.1.1.4.2 Microwave digestion method Weigh

0.5 g (accurate to

0.1 mg) of the specimen and place it into a PTFE digestion liner. Add 5~8 mL of nitric acid and 2 mL of 30% hydrogen peroxide. For materials with a high silica content, an additional 3 mL of hydrofluoric acid must be added. Alternatively, depending on the sample matrix, select an appropriate sample mass and acid addition method to ensure complete digestion of the sample. Cover the vessel and allow it to stand for 1 h. Seal the digestion vessel and place it into a microwave digestion system. Proceed with the digestion according to the standard operating procedures for the microwave digester. Upon completion of the digestion, remove the vessel from the digester. Allow the vessel to cool completely before slowly opening the inner lid. Transfer the digest solution into a 50 mL volumetric flask. Rinse the digestion vessel and lid 3~4 times with water, and transfer the rinsings into the volumetric flask. Dilute to the mark with water. If the solution is not clear or if a precipitate forms, filter the solution and retain the digested sample solution for analysis. 6.1.1.4.3 Other digestion methods Provided that the specimen can be completely digested, other digestion

methods, such as wet acid digestion or ashing, may also be employed to treat the specimen and obtain the digest solution for subsequent analysis. 6.1.1.4.4 Blank test With the exception of omitting the test specimen, proceed in accordance with 6.1.1.4.1, 6.1.1.4.2, or 6.1.1.4.3 to obtain the blank digested solution. NOTE. The digestates obtained from 6.1.1.4.1, 6.1.1.4.2, 6.1.1.4.3, and 6.1.1.4.4 are used for the determination of the elements listed in Annex A ~ Annex C.

6.1.2 Determination of lead The lead content in the printing ink shall be determined in accordance with Annex A or Annex B. The method specified in Annex B serves as the arbitration method.