
**Graphic technology — Prints and
printing inks — Assessment of
resistance of prints to various agents**

*Technologie graphique — Impressions et encres d'imprimerie —
Évaluation de la résistance des impressions à divers agents*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 130, *Graphic technology*.

This fourth edition cancels and replaces the third edition (ISO 2836:2004), which has been technically revised.

The main changes compared to the previous edition are as follows:

- consistency and document structure have been improved and an Introduction has been added;
- new agents have been added;
- information that aspects of food safety and consumer protection for food contact materials are not covered has been added.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

During its service life, prints might need to resist certain agents. These agents can come in contact with prints during finishing operations like varnishing, or accidentally via interactions with certain vapours, fluids or solids like spilling of package contents onto the print. These kinds of agents can cause visual alterations to the print. These changes are due to either the colorants used in the inks or the substrate itself not being resistant to the particular agent.

This document defines laboratory test methods for the interaction of agents and prints and gives guidelines and requirements for the evaluation of changes on the print caused by those agents. All the methods within this document aims to allow a reasonable choice of raw materials to be used for the printing inks and substrates and for the testing of the prints for qualification purposes. The aim of all these methods is to avoid visual changes of the prints caused by the agents. Aspects of food safety and consumer protection for food contact material are not covered.

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Graphic technology — Prints and printing inks — Assessment of resistance of prints to various agents

1 Scope

This document specifies methods of assessing the resistance of printed materials to liquid and solid agents, solvents, varnishes and acids.

It applies to printing on all substrates by any of the traditional printing process (offset, screen, gravure, flexo) as well as the newer digital processes (inkjet, electrophotography).

Aspects of food safety and consumer protection for food contact materials are not covered.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 105-A03, *Textiles — Tests for colour fastness — Part A03: Grey scale for assessing staining*

ISO 187, *Paper, board and pulps — Standard atmosphere for conditioning and testing and procedure for monitoring the atmosphere and conditioning of samples*

ISO 13655, *Graphic technology — Spectral measurement and colorimetric computation for graphic arts images*

ISO 14487, *Pulps — Standard water for physical testing*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

agent

liquid or solid to which a sample of printed material is exposed for the purpose of determining the *resistance* (3.2) characteristics of that printed sample

3.2

resistance

ability of a printed material to withstand exposure to a specified *agent* (3.1) as determined by the tests defined in this document

3.3

test piece

section of a test print or section of a print from a conventional or digital printing press

4 Principle

A test piece is either immersed in the prescribed agent, pressed between agent-soaked filter papers or brought into direct contact of its printed side with the agent for a given time.

Colour changes of the test piece, the agents and the filter papers are noted, characterized and reported.

5 Agents

5.1 General

The type of agent used, and its concentration shall be reported.

5.2 Water

This document does not specify the type of water used for the assessment of resistance of prints. It may be tap water, distilled water, deionized water, natural water, etc. The type of water used shall be reported. For the purpose of rinsing filter papers and test pieces after tests, deionized water according to ISO 14487 shall be used.

5.3 Alkali

This document specifies a 1 % by mass solution of sodium hydroxide in distilled water used for the assessment of resistance of prints.

5.4 Oils and fats

This document does not specify the oil or the fat to be used for the assessment of resistance of prints. It may be animal, vegetable, mineral, essential or synthetic. Examples of such oils include but are not limited to: fish oil, olive oil, liquid paraffin, lavender oil, silicone oil, butter, margarine, lanolin, grease.

5.5 Cheese

This document does not specify the type of cheese, for example soft cheese or hard cheese, used for the assessment of resistance of prints. However, the cheese shall be used as a solid agent in a natural state, i.e. not liquefied.

5.6 Detergents

This document does not specify the type of detergent, such as liquid or solid, used for the assessment of resistance of prints, only its concentration: 1 % by mass.

5.7 Soaps

This document does not specify the type of soap, hard or soft, used for the assessment of resistance of prints, only its concentration: 1 % by mass.

5.8 Waxes

This document does not specify the type of wax to be used for the assessment of resistance of prints, i.e. animal, vegetable, mineral or synthetic, such as beeswax, carnauba wax, paraffin wax, Fischer Tropsch wax.

5.9 Spices

This document does not specify the spice to be used for the assessment of resistance of prints.

5.10 Organic solvents and varnishes

Ethanol shall be denatured. The solvent mixture of ethanol, ethyl acetate and 1-methoxy-propanol-2 shall have a volume composition of 60 % ethanol, 30 % ethyl acetate and 10 % 1-methoxy-propanol-2. Methyl ethyl ketone (MEK) is a suitable solvent to test the degree of curing for uv inks. Any other solvent or varnish for assessing the resistance of prints may be used.

5.11 Acids

This document does not specify any particular acid or concentration. It give examples of acids that are commonly found commercially and in homes, which can be used for the assessment of resistance of prints. The acid and concentration should be chosen according to the intended application of the print. The following acids are mentioned in this document:

- lactic acid to simulate cheese and cheese products;
- citric acid to simulate the juice of citrus fruits;
- acetic acid to simulate pickles and vinegars;
- hydrochloric acid to simulate products with pH values <2;
- sulfuric acid.

5.12 Other agents

The test methods set out in this document may be used in the assessment of the resistance of prints to other agents such as the following:

- hydraulic fluids;
- perfumes, deodorants, standards.iteh.ai/catalog/standards/sist/2021ba22-3989-40fa-beb9-813db516bee1/iso-2836-2021
- beverages: coffee, tea, beer, spirits, carbonated drinks;
- cosmetics: lipstick; skin cream;
- perspiration simulants according to ISO/IEC 10373-1;
- carbonated water, sea water;
- sodium hypochlorite solution (1 %);
- sodium carbonate solution (1 %);
- saliva simulants.

NOTE A composition for saliva simulant can be found in DIN 53160.

6 Apparatus

This clause lists supplies and equipment necessary to perform resistance tests.

6.1 Glass plates, 2 glass plates, 60 mm × 90 mm × 2 mm.

6.2 Laboratory filter paper¹⁾, for qualitative chemical analysis, white, neutral, with a very smooth and soft surface, cut into strips 60 mm × 90 mm. Filter paper shall be manufactured from cotton linter. It

1) Whatmann filter paper grade 1 is an example of suitable filter paper available which meets these requirements. This information is given for the convenience of this document and does not constitute an endorsement by ISO of this product.

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shall contain a minimum of 98 % alpha cellulose, have a basis weight of $(90,0 \pm 1,0)$ g/m² and a thickness of (180 ± 20) µm.

6.3 Petri dish, ≥ 100 mm in diameter with an additional glass disk with a diameter slightly smaller than the inner diameter of the dish.

6.4 Test tubes, 2 test tubes, of colourless glass, with inside diameter of approximately 16 mm and a height of approximately 160 mm.

6.5 Mass, 1 kg.

6.6 Stop watch, with an accuracy of 1 s.

6.7 Thermometer, capable of measuring from 10 °C to 50 °C with an accuracy of $\pm 0,5$ °C and in case of measuring molten wax a thermometer suitable for measuring up to 200 °C.

6.8 Oven, capable of maintaining a temperature of (50 ± 2) °C.

6.9 Hot plate, capable of heating to 40 °C above melting point of the wax.

6.10 White background wall, with side illumination for colour determination.

6.11 Grey scale, for colour contrast evaluation according to ISO 105-A03.

6.12 pH measuring device, e.g. test strip or meter.

6.13 Spectrocolorimeter, conforming to the requirements of ISO 13655-9-40fa-beb9-813db516bee1/iso-2836-2021

7 Preparation of test pieces

Test pieces may be taken from existing printed material or may be prepared to be representative of a planned printed product.

If production samples are tested, it is important to know the time of production and preferably the storage conditions. Conditioning of the test pieces in accordance with ISO 187 is recommended.

Prepare production prints or test prints using any suitable method that allows a uniform distribution of ink to be formed on a specified substrate and cured in an appropriate manner, for example, prepared in accordance with ISO 2834-1 for offset printing process, with ISO 2834-2 for gravure or flexographic printing processes, or with ISO 2834-3 for screen printing process. Prints shall be set, dried or cured completely before assessing the resistance. Heatset inks shall be heated to the recommended temperature, oxidative setting inks shall be allowed to fully oxidize, water or solvent inks shall be given suitable time for the loss of solvent and energy cured inks shall be exposed to the appropriate radiation (UV, LED-UV, EB) for a reasonable exposure time. Prepare at least two but preferably 4 extra test pieces for reference and comparison with the treated test pieces.

8 Test methods

8.1 General

All tests are comparative by nature. Blind tests for all methods where filter papers and/or solid surfaces are used shall be performed. For tests with solid agents the environmental conditions according to ISO 187 shall be applied.