
खाद्य पैकेजिंग के लिए मुद्रण स्याही —
रीति संहिता
(पहला पुनरीक्षण)

Printing Ink for Food Packaging —
Code of Practice
(First Revision)

ICS 55.040; 67.230; 87.080

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FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards after the draft finalized by the Inks, Stationery and Allied Products Sectional Committee had been approved by the Chemical Division Council.

This Indian Standard was first published in 2004. This standard was formulated with a view to assist the manufacturers of printing inks to produce inks, which are intended for use on food packages and which do not contain any hazardous chemicals that may get transferred to the food packed, and help food packers and manufacturers of packages in selecting proper quality printing ink. General guidelines for exclusion of certain substances from printing ink formulations intended for use on food packages have also been prescribed in this standard.

The committee responsible for development of this standard has reviewed the standard in view of overall impact of constituent chemicals of the ink formulation considering their reported toxicological profile, hazardous to environment and health of human being and possible contamination of food product while food products are being packed in the printing packages. The committee, therefore, decided to revise this standard by incorporating prohibition of toluene under 'solvents' category, phthalates (di-n-butylphthalate, di-isobutyl phthalate) under 'plasticizers' category and titanium acetylacetonate under 'various compounds' category in Annex-A of exclusion list on the basis of their hazards to health and environment. Provision also incorporated in the revised version to restrict limit of the sum of concentration levels of lead, cadmium, mercury and chromium (VI) to 100 ppm for printing inks. Also, technical advancements that have taken place since the publication of this standard have been considered in this revision.

There is no ISO standard on the subject.

The composition of the committee member significantly contributed for formulation of the standard is given in Annex B.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2: 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Indian Standard***PRINTING INK FOR FOOD PACKAGING —
CODE OF PRACTICE***(First Revision)***1 SCOPE**

This standard prescribes guidelines for printing inks for use on food packages.

2 REFERENCES

The following Indian standard contains provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below:

<i>IS No.</i>	<i>Title</i>
4395 : 1987	Glossary of terms relating to inks and allied industries (<i>first revision</i>)
6931 : 1972	Methods of test for printing inks
9873 (Part 3) : 2017/ ISO 8124-3 : 2010	Safety of toys: Part 3 Migration of certain elements (<i>second revision</i>)

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 4395 shall apply.

4 PRINTING INKS FOR USE ON FOOD PACKAGES

4.1 The packaging of food, as far as printing ink is concerned, can be divided into the following four categories.

4.1.1 External Packaging

Any packing additional to an immediate food wrapping. This relates to inks for printing external food wrappings, where there is a barrier in the form of another wrapper between the printed surface and the food.

4.1.2 Immediate Food Wrappings

Wrapping material in direct contact with food.

4.1.3 Print in Direct Food Contact

Printed wrapper or insert, where the printed side is in direct contact with food.

4.1.4 Disposables

This covers paper plates, drinking straws, table napkins and other disposables, which might be used to wrap or hold food.

4.2 Printing Inks for External Packing

In external packing, the printed matter has a barrier in the form of another additional wrapper layer between it and the food. The very low mass of the ink is generally used to print on such packing and the remoteness of ink itself from the food make any additional safeguards unnecessary. The components in printing ink need to comply with exclusion list given in Annex A.

4.3 Printing Inks for Immediate Food Wrappings

4.3.1 In case the printing ink film is deliberately applied to the surface intended to be in contact with food, there is likely possible of migration of some ink ingredients into the food and therefore, the printing ink for such a purpose shall have to be formulated with materials which are permissible as food additives and comply with the appropriate regulations of the Government of India.

4.3.2 The over coating of printed matter with food grade varnish/coating to provide a functional barrier between the printed side and the food may not, under all conditions, prevent migration of some ink ingredients from printed surface into the food and therefore, may not prevent contamination. It is, therefore, necessary that inks for immediate food wrappings must be applied to the outside of the wrapper. The wrapper itself shall form a functional barrier between the printed surface and the food.

4.3.3 The ink film applied on the wrapper is generally extremely thin and consequently, the total quantity of ink involved is very small. However, in order to impose the safeguard, inks for immediate food wrappings shall be formulated with materials, which are proven non-toxic nor hazardous to health and shall also not contain material listed in Annex A.

4.3.4 The immediate food wrappers shall be printed in such a manner that set-off in the printing process is avoided. This is necessary to ensure that the surface of the wrapper in contact with food is free from printing ink.

4.3.5 The materials and articles in contact with food, that is, food packages or wrappers shall be so manufactured that under normal or foreseeable condition of use, they shall not transfer their constituents to the food in quantities which may endanger human health, cause a deterioration in the organoleptic characteristics or unacceptable change in the nature, substance and/or quality of food.

4.4 Printing Inks for Prints in Direct Food Contact

As prescribed in **4.3.1** to **4.3.4** and as far as possible, the printed surface should not be in immediate contact with food. However, if it is necessary for the printed surface to be in direct contact with food, the guidelines prescribed in **4.3.5** shall apply and the printing inks shall have to be formulated with materials, which are acceptable as food additives under the appropriate regulations of the Government of India.

4.4.1 In case of printed films or coupon inserts for dry granular foods, printed inks shall be formulated in such a way that there is no risk of migration of substances from printing inks onto the food. In general, requirements of **4.3.1** and **4.3.2** apply there.

4.5 Printing Inks for Disposables

Printing inks for disposables shall be formulated with ingredients necessarily excluding the substances listed in Annex A or those, which are otherwise known to be toxic and hazardous to health. As far as possible and practicable, the printing ink manufacturers shall ensure that inks are formulated in such a way as to avoid migration of dyes or other colouring agents, liable to bleed under the expected conditions of use, onto the food. Whenever there are issues related to biodegradability of the packaging material, printing ink manufacturers need to consider biodegradability of ink raw materials.

5 GENERAL CODE OF PRACTICES

5.1 Inks for printing external food wrappers, where there is a functional barrier in the form of another wrapper between the printed wrapper and the food, may be formulated without restriction, provided the ingredients are considered to be non-toxic and non-injurious to health, as referred in the general exclusion list is given in Annex A, which are not present in the printing ink composition.

5.2 As far as possible and practicable, the printed surface should not come in contact with food and

printing inks for immediate food wrappers shall be applied on outside of the wrapper, which, by itself, shall form a barrier between the ink and the food.

5.3 Immediate food wrappers shall be of sufficiently low permeability to prevent migration and shall be printed in such a manner that set-off in the printing process is avoided.

5.4 Where the nature of the food packaging is such that migration or bleeding form dyes or other soluble colouring agents is likely to occur, printing inks shall not be formulated with such colouring agents.

5.5 If, for some specific requirements, it is necessary for the printed surface to be in contact with food, the printing inks shall be formulated with materials acceptable as food additives under the appropriate regulations of the Government of India, be manufactured in an appropriate manner to prevent contamination and, where printed, produce a non-toxic printed surface that complies with appropriate Regulations of the Government of India.

5.6 The printing ink manufacturers are expected to take all necessary precautions to meet the guidelines of this standard. However, as they have no overall control over the printing process or the actual wrapping/packing, the final responsibility for ensuring that there is no deterioration in the organoleptic characteristics of the food rests with the food packager.

5.7 The printing ink manufacturers shall inform the converters and point buyers on suitability of ink type towards packages of food and the norms followed in formulation whenever there is such need.

5.8 The general exclusion list may be reviewed and amended in the light of new data on safety, health, environment and relevant regulation.

5.9 The sum of concentration levels of lead, cadmium, mercury and chromium (VI) shall not exceed 100 ppm for printing inks.

6 RESPONSIBILITY

6.1 Responsibility of Print Buyer/Printer — Packaging Design, Selection etc.

Packaging should be designed with the restrictions of printing in mind. For example, printing should not occur in areas, which, by folding, come into contact with food. It is important that the substrate itself should not cause taint and odour of the packaged product. Taint and odour tests should be conducted to ensure that a particular substrate is suitable for use. The relationship between press speed and curing/drying power needs to be fully understood to ensure adequate curing/drying takes place.

6.2 Responsibility of Ink Manufacturers

Only raw materials other than those known to be toxic, carcinogenic, sensitizing or mutagenic are used in the formulation of inks and coatings, to be governed by the exclusion list given in Annex A. Ink companies should conduct regular testing on ink components, retained solvents from flexo/gravure packages, and distillates from conventional offset products, which have the possibility to migrate from the packaging into food. This capability brings control on risk assessments and ensures that printed packages are suitable for food packaging. Traces of impurities (including those listed in Annex A) coming from the raw materials in printing inks are unavoidable as these raw materials are produced under commercial industrial conditions. The ink manufacturer should make every effort with the supply chain to ensure that impurities are kept at

minimum level. MSDS should also be declared by the Ink Manufacturers.

6.3 Responsibility of the Printer

The responsibility of the printer and converter is to ensure that food packages are manufactured and stored in such a manner by which all preventable transfer of material from the ink or coating to the food contents is avoided, even if such transfer is unobjectionable on the grounds of health, odour and flavour. Printed matter, following approval by appropriate quality control tests, should be stored appropriately so that no deterioration in its performance against these tests occurs. The storage environment should be free from potential volatile contaminants, which could have adversely affected the organoleptic characteristics of the food.

ANNEX A

(Clauses 4.2, 4.3.3, 4.5, 5.1 and 6.2)

GUIDE TO MATERIAL AND SUBSTANCES FOR EXCLUSION
FROM PRINTING INK FORMULATIONS

A-1 Pigments and compounds based on antimony (*see Note 1*), arsenic, cadmium, chromium (VI), lead (*see Note 2*), mercury and selenium.

NOTES:

1 With the exception of non-biodegradable antimony titanate present in titanium dioxide pigments.

2 Except where necessary in certain screen inks to meet specified resistance requirements.

A-2 DYE COLOURANTS

A-2.1 Auramine (Basic Yellow 2 — CI 41000)

A-2.2 Chrysoidine (Basic Orange 2 — CI 11270)

A-2.3 Cresylene Brown (Basic Brown 4 — CI 21010)

A-2.4 Fuchsine (Basic Violet 14 — CI 42510)

NOTE — formerly listed as 'magenta'.

A-2.5 Induline (Solvent Blue 7 — CI 50400)

Azo dyes which can decompose in the body to bioavailable aromatic amines that are classified as category 1A or 1B carcinogens.

NOTE — In case of pigment and dye based on heavy metal, the permissible limit for heavy metal shall be as follows:

<i>Metal</i>	<i>Requirement (ppm)</i>
As	25, <i>Max</i>
Ba	1000, <i>Max</i>
Cd	75, <i>Max</i>
Cr (VI)	60, <i>Max</i>
Hg	60, <i>Max</i>
Pb	90, <i>Max</i>
Sb	60, <i>Max</i>

For testing above heavy metals in printed substrate, IS 9873 (Part 3) may be referred for migration in dilute HCl and water followed by analysis through ICP-OES.

A-3 SOLVENTS

A-3.1 Benzene

A-3.2 Dichlorobenzene

A-3.3 2-ethoxy Ethanol

A-3.4 2-ethoxy Ethyl Acetate Methanol (*see Note below*)

A-3.5 2-methoxy Ethanol

A-3.6 2-methoxy Ethyl Acetate

A-3.7 Monochlorobenzene

A-3.8 2-nitropropane

A-3.9 Toluene

A-3.10 Volatile Chlorinated Hydrocarbons (*see Note below*)

A-3.11 Volatile Fluorochlorinated Hydrocarbons

NOTE — With the exception of their use as denaturants for ethanol to meet legal requirements.

A-4 PLATICIZERS

A-4.1 Chlorinated Naphthalenes

A-4.2 Chlorinated Paraffins

A-4.3 Di-n-butylphthalate (DBP)

A-4.4 Di-isononyl Phthalate (DINP)

A-4.5 Monocresyl Diphenyl Phosphate

A-4.6 Monocresyl Phosphate

A-4.7 Polychlorinated Biphenyls

A-4.8 Polychlorinated Terphenyls

A-4.9 Tricresyl Phosphate

A-5 VARIOUS COMPOUNDS

A-5.1 Asbestos

A-5.2 Brominated Flame Retardants

A-5.3 Diaminostibene and Derivatives

A-5.4 2,4 Dimethyl 6 tertiary Butyl Phenol

A-5.5 Dioxins

A-5.6 Hexachlorocyclohexane

A-5.7 Nitrosamines

A-5.8 Pentachlorophenol and its Salts

A-5.9 Polychlorinated Dibenzofuranes

A-5.10 4,4 Tetramethyldiamino Benzophenone (Michlers Ketone)

A-5.11 Toluene Di-isocyanate

A-5.12 Titanium Acetylacetonate

A-5.13 Vinyl Chloride Monomer

ANNEX B*(Foreword)***EXPERTS WHO MADE SIGNIFICANT CONTRIBUTION TO THE
DEVELOPMENT OF THIS STANDARD**

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Whale Stationery Products Ltd, Delhi	SHRI MUKESH GUPTA
All India Print-Tech Professionals Forum, Kolkata	SHRI PARTHA PRATIM SANYAL
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Member Secretary

SHRI SAGAR SINGH
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