

Paper based packaging materialsSectionalLast date of comments: 15th April 2024Committee, CHD 16

FOREWORD

(Formal clauses to be added later)

A range of various boards such as folding box boards, in the form of a coherent sheet or web, are used for printing, packaging, decorating etc. The advantages of such boards may include density, smoothness, brightness and yield. Pulp of ground wood fibre is less dense (weighs less) than kraft chemical pulp. Therefore, at a given basic weight, the sheet is thicker. This additional thickness enhances stiffness in the finished carton. Optical brightening agents such as fluorescent dyes may be used in coatings for food grade paperboard packaging. This can result in exceptional brightness with some of the board varieties. However, disadvantages include a loss of tear strength, internal strength and colour fastness. Even though a folding box board (FBB) carton of similar weight is thicker and stiffer, it tends to be more brittle and less elastic. The residual lignin in ground wood fibre tends to rapidly yellowing with exposure to UV light; therefore, these grades may not be suitable for outdoor applications. However, compression strength of folding box board can be quite good and with proper cutting, creasing and gluing, successful results can be achieved.

Major end uses of folding boxboard are for health and beauty products, including toiletries, frozen, chilled and other foods, beverages, including spirits & wines, confectionaries, pharmaceuticals, graphical uses, cigarettes, CD and diskette covers and other premium merchandising. They are also suitable for blister packs.

In view of fast emerging market of folding box board and entry of different national and international manufacturers in this field, coupled with technological developments, the need to outline a standard for the product was felt. IS 1776 Folding box board uncoated' and IS 12999 Folding box board coated are available standards for packaging. However, it was felt that a separate standard is required for use in general consumer products. This standard is intended to define the quality of folding box board to assure the supply of proper quality of such boards to consumers. It is expected that this standard would help manufacturers and consumers to communicate from a single platform, especially for those who prefer to adhere with a pre-defined standard for procurement as per need of their requirement. It is also expected that this standard will assist the manufacturers to control the quality of their products and the consumers to obtain material of proper quality.

This standard was first published in 2018 during which considerable assistance was derived from the data made available by various organizations like JK Paper, ITC, Century Paper, Divya Shakti, Siddarth, Khanna, Murali Agro, Rainbow, etc, and PAPRI, where a number of tests were carried out for the purpose.

In this first revision, the following changes have been made:

- a) Reference clause has been updated;
- b) Construction clause has been modified;
- c) New requirement and method of test for Print resistance and ink adhension of printed cartons has been incorporated;
- d) Cobb 60 Second requirement has been removed;
- e) Requirements for thickness, grammage, bulk, moisture, Stiffness, brightness, gloss, IGT dry pick and roughness have been updated;
- f) Bendtsen smoothness requirement has been specified for material when bottom is coated or uncoated, and
- g) The optional requirement for ECO mark has been deleted.

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: 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Draft Indian Standard Folding Box Board for General Consumer Product Packaging — Specification

(First Revision)

1 SCOPE

This standard specifies the requirements, methods of sampling and test for folding box board for general consumer product packaging.

2 REFERENCES

The standards given in **Annex A** contain provisions which through reference in this text, constitute provision 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 editions of the standards.

3 TERMINOLOGY — For the purpose of this standard, the definitions given in IS 4661 shall apply, in addition to the following:

3.1 Folding Box Boards (FBB)

This board is made from layers of mechanical pulp or a combination of mechanical and chemical pulp, sandwiched between layers of bleached chemical pulp. The top layer is, generally of white back by white pigment coating. The back can also be white pigment coated or manila coloured. This is a low density material with high stiffness and has a slightly yellow colour, mainly on the inside.

3.2 Chrome Paper

A paper or board coated on one side with material containing adhesive, china clay (Kaolin) etc. The coating on one side could be glossy or matt as per requirement of the customer. Used mainly for self adhesive stickers, calendars, posters, labels and for application where only one side has to be printed.

3.3 Mixed Waste Board

Pieces of board that may be reclaimed after use or from a converting process for re-pulping and making again into board.

3.4 Intermittent Machine

A machine for forming sheets of board. It consists of either a fourdrinier former or one or more cylinder moulds or vats. The wet web is wound on a drum forming a continuous mat of several layers.

3.5 Delamination, Interlaminar Strength

Delamination strength or interlaminar strength is usually defined by a number of methods designed to measure the force or energy required to separate or delaminate the interior structure of paperboard, that is, the bonding within or between the plies, not the interface between the fibres and coating or within the coating itself.

3.6 Interlayer Strength, Plybond

As a multi-ply paperboard is built from several layers of fibres, it is important that these layers are well bonded together. Interlayer strength is the expression used to quantify this property. By plybond test, the energy needed to

delaminate a sample by applying a perpendicular force to the paperboard surface is quantified. The test result is expressed in J/m².

4 CONSTRUCTION

The construction of folding box board for general consumer product packaging shall comprise of following layers:

- a) Top coating : The coating grammage (Combined Pre-coat & Post-coat) shall be 20 ± 6 gsm;
- b) Top layer : It shall be from virgin chemical pulp;
- c) Middle layer : It shall be from BCTMP (Bleached chemi-thermo mechanical pulp) and virgin pulp;
- d) Back layer : It shall be from virgin chemical pulp, and
- e) Bottom coating: It shall be of 6 to 8 gsm, but it is optional based on customer requirements.

5 REQUIREMENTS

5.1 General

The boards shall be uniform in thickness and shall lie flat and be dimensionally stable. Both sides of the board shall be clean and free from loosely bound fibres, holes, hard spots and lumps. The printing surface shall be smooth, of even finish, formation, absorbency and colour. The surface liner shall be opaque and free from patchy finish.

5.1.1 Slitting and Cutting

Sheets shall be cut cleanly and square to specified dimensions. Reels shall be evenly wound. All cut edges shall be free from loose fibres and dust.

5.2 Squareness

The tolerance on squareness shall be such that the shorter diagonal of the sheet shall not differ from the longer by more than one percent of the former.

5.3 Thickness

Normally the thickness for folding box board is between 300 to 750 micron. However, the thickness of folding box board other than these shall be as agreed to between the buyer and the supplier. A tolerance of \pm 5 percent shall be allowed on the average thickness when tested in accordance with IS 1060 (Part 5/Sec 3).

5.4 Grammage

Normally the grammage for folding box board is between 200 to 450 gsm. However, the nominal grammage of folding box board other than this shall be as agreed to between the purchaser and the supplier. A tolerance of \pm 5 percent for individual test results and \pm 3 percent for the average of 10 test results shall be allowed on the nominal grammage, when tested in accordance with IS 1060 (Part 5/Sec 5).

5.5 Sizes

The sizes of the board shall be as agreed to between the buyer and the supplier. The tolerance on the sizes shall be on the positive side with a maximum of 1 mm when tested in accordance with 1060 (Part 5/Sec 3).

5.6 Print resistance and ink adhension of printed cartons

The material shall pass for the print resistance and ink adhension when tested in accordance with the **Annex B** and **Annex C** of this standard

5.7 Stiffness [Bending resistance]

The average L&W Bending stiffness value for different grammages of board shall be as given in **Table 1** and **Table 2** and shall be determined for machine direction (MD) and cross direction (CD) by the method prescribed in IS 1060

(Part 5/Sec 8). The tolerance on each mean value shall be within \pm 15 percent for both MD and CD. The ratio of MD to CD(MD/CD) shall be between 1.8 and 2.4 for all grammage.

5.8 Strength

The board shall be stiff, shall not easily delaminate, and after being properly creased, shall fold neatly at 180° without cracking.

5.9 The board shall also comply the requirements given in **Table 1**.

(<i>Clause</i> 5.7, 5.9 and 7.2)				
Sl. No.	Characteristic	Requirements		Method of Tests, Ref to
(1)	(2)	(3)		(4)
i)	Bulk, cc/g	1.50 ± 5 p	ercent	IS 1060 (Part 5/Sec 3)
ii)	Moisture, percent	6.0 to 9.0		IS 1060 (Part 5/Sec 2)
iii)	Stiffness (Bending resistance), L&W, mN	MD Tolerance +15%	CD Tolerance +15%	TAPPI T-556
	200 gsm	140	70	
	250 gsm	250	125	
	300 gsm	400	200	
	350 gsm	650	325	
	400 gsm	900	450	
	450 gsm	1200	600	
iv)	Brightness, Indoor C/2°, percent, Min	85		IS/ISO 2470-1
v)	Gloss 75°, percent, Min	35		IS 1060 (Part 5/Sec 12)
vi)	Ply Bond Strength, J/m^2 , <i>Min</i>	135		T-569 pm-00
vii)	IGT dry pick, m/s,Min	1.0		1060 (Part 5/Sec 9)
viii)	Roughness (pps), Max	2.0 1060 (Part		1060 (Part 5/Sec 17)

(Folding Box Board for General Consumer Product Packaging) (Clause 5.7, 5.9 and 7.2)

Table 1 Requirements for Multilayer Boards

5.10 Optional Requirements

5.10.1 When agreed to between purchaser and the supplier, the board shall also comply with the requirements given in **Table 2**.

Table 2 Optional Requirements for Folding Box BoardFor General Consumer Product Packaging

(*Clause* 5.7 and 5.10.1)

Sl. No	Characteristic	Requirements	Method of Tests, Ref to
(1)	(2)	(3)	(4)
i)	Surface <i>p</i> H	Declared value ± 0.1	IS 1060 (Part 3)
ii)	Burst Factor, kg/cm ² , Min	20	IS 1060 (Part 7/Sec 1)
iii)	Wax pick number	No pick at 14A	IS 1060 (Part 3)
iv)	SOAT, Sec (Surface oil absorbency test)	600 ± 5	IS 1060 (Part 1)

v)	Bendtsen smoothness, ml/min, Max		IS 1060 (Part 5/Sec 20)
	Top side	50	
	Back side,		
	If bottom side is coated	500	
	If bottom side is uncoated	1000	
vi)	Water soluble chlorides (as sodium chloride (NaCl)), percent by mass, <i>Max</i>	0.08	IS 1060 (Part 4/Sec 8)
vii)	Water soluble sulphates [(as sodium sulphate (Na ₂ SO ₄)], percent by mass, <i>Max</i>	0.25	IS 1060 (Part 4/Sec 9)
viii)	Fatty and/or similar acids (as C ₁₇ H ₃₃ COOH), percent by mass, <i>Max</i>	0.25	IS 1060 (Part 2)

5.10.2 Product specific requirement

The paper and paper boards packaging materials shall be manufactured from the following raw materials:

5.10.2.1 In case of direct food contact usage, the paper board shall confirm to IS 16983 or IS 1776 or IS 12999 except for the requirement of grammage. In addition, the paper board shall be OBA (Optical brightening agent) free, and anthraquinone shall not be used in pulp which is used for making paper board. The paper board shall be of virgin material.

5.10.2.2 Paper and paper boards used for Consumer packaging shall be manufactured from virgin pulp and shall be free from dioxins & Furans (<1ppb, measured as per USEPA 1613). If it is used for Food Packaging, Printed surfaces of paper shall not come into contact with the food and the maximum amounts of contaminants in paper intended to come into contact with food shall not exceed the limits prescribed in **Table 3** when tested according to the methods given in **Annex C** of IS 3962

Table 3 Limits of Contaminants in Paper

Sl. No	Contaminant	Paper Intended to Come into Contact with Dry Food (mg/kg of Paper)	Paper Intended to Come into Contact with Wet Food and Food with Fatty Surface (mg/kg of Paper)	Paper for Filtration (mg/kg of Paper)
(1)	(2)	(3)	(4)	(5)
i)	Cadmium (Cd)		0.5	0.5
ii)	Chromium (Cr ⁶⁺⁾		0.1	0.1
iii)	Lead (Pb)		3.0	3.0
iv)	Mercury (Hg)	—	0.3	0.3
v)	Pentachlorophenol (PCP)	0.05	0.05	0.05
vi)	Polychlorinated biphenyls (PCBs)	2.0	2.0	0.5

6 PACKING AND MARKING

6.1 Packing

The boards shall be securely and suitably packed as agreed to between the buyer and the supplier.

6.2 Marking

6.2.1 Each package shall be marked with the following particulars:

- a) Description of the material;
- b) Size of the board;
- c) Net mass of contents;
- d) Batch number;
- e) Date of manufacture; and
- f) Manufacturer's name and/or recognized trade name.

6.2.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed there under, and the products may be marked with the Standard Mark.

7 SAMPLING AND CRITERIA FOR CONFORMITY

7.1 The boards shall be sampled in accordance with 4 of IS 1060 (Part 1).

7.2 Tests

From each of the packets, selected from the lot, the board shall be taken out at random. These boards shall constitute the sample. The boards selected shall be tested for requirement given in **5.1** to **5.5**. One test piece shall be cut from each selected board and tested for each of the characteristics prescribed in **5.7** to **5.9** and **Table 1**. Individual sample of board not meeting the requirements for any one or more characteristics shall be considered as defective.

7.3 Criterion for Conformity

A lot shall be declared as conforming to all the requirements of this specification if the number of defective boards found does not exceed the acceptance number. This acceptance number shall depend upon the size of the sample (*see* **7.2**) and shall be zero if the size is less than 13 and one if it is greater than or equal to 13.

ANNEX A

(Clause 2)

LIST OF REFERRED INDIAN STANDARD

IS No.	Title
IS 1060	Methods of Sampling and Test for Paper and Allied Products
(Part 1): 2022	Part 1 Test Methods for General Purpose (second revision)
(Part 2): 1960	Methods of sampling and test for paper and allied products, Part 2
(Part 3): 1969	Methods of sampling and test for paper and allied products, Part 3
(Part 4)	Methods of test for paper, board and pulps
(Sec 8) : 2014	Determination of water soluble chlorides
(Sec 9) : 2014	Determination of water soluble sulphate
(Part 5)	Methods of Test for Paper and Board
(Sec 2) : 2021	Determination of moisture content of a lot Oven-drying method (first revision)
(Sec 3) : 2014	Determination of thickness, density and specific volume
(Sec 5) : 2021	Determination of grammage (first revision)
(Sec 8) : 2014	Determination of bending resistance — Taber-type tester
(Sec 9) : 2014	Determination of resistance to picking — Accelerated speed method using the IGT-type tester (electric model)
(Sec 12) : 2014	Measurement of specular gloss — 75 degree gloss with a converging beam, TAPPI method (<i>first revision</i>)
(Sec 17) : 2014	Determination of roughness/smoothness (Air leak methods) - Print-surf method
(Sec 20) : 2018	Determination of roughness/smoothness (Air leak methods) - Bendtsen method
(Part 7/Sec 1) : 2014	Methods of test for board: Sec 1 determination of bursting strength of board
IS/ISO 2470-1 : 2009	Paper, board and pulps — Measurement of diffuse blue reflectance factor: Part
IS 3962 : 1967	Waxed paper for general packaging
IS 4658 : 2019	Specification for coated paper and board (Art And Chromo) (second revision)
IS 4661 (Part 1) : 2022/ISO 4046-1 : 2016	Glossary of terms used in paper trade and industry (second revision)
T-569 pm-00	TAPPT — Internal bond strength (Scott type)

ANNEX B

(*Clause* 5.6)

TEST FOR PRINT RESISTANCE OF PRINTED CARTONS

B-l Leave the paper based multilayer laminated/extruded composite cartons to stand for at least 24 h after printing.

B-2 Smear the paper based multilayer laminated/extruded composite cartons, or representative section cut from the printed area with liquid food intended to be packed in at ambient conditions and leave it for 1 h.

B-3 Wash the paper based multilayer laminated/extruded composite cartons or its representative section with cold water.

B-4 Rub each paper based multilayer laminated/ extruded composite carton or representative section firmly with hard paper tissue ten times.

B-5 There shall be no significant removal of the print from the surface of the paper based multilayer laminated/extruded composite carton and the print shall be legible to the naked eye after the test

ANNEX C

(*Clause* 5.6)

TEST FOR INK ADHESION OF PRINTED CARTONS

C-1 Apply two strips of 25 mm wide transparent pressure sensitive taps or cello-tape to the printed area of the paper based multilayer laminated/extruded composite carton. One piece down the length of the carton and the other along the width.

C-2 Press the tape firmly on to the paper based multilayer laminated/extruded composite carton and leave for 15 s.

C-3 Remove the tape by pulling slowly at about 10 mm/s from one end at about 90° to the paper based multilayer laminated/extruded composite carton surface.

C-4 There shall be no significant removal of the print from the surface of the paper based multilayer laminated/extruded composite carton and the printed material shall be still legible