

**Partial Agreement
in the Social and Public Health Field
Accord Partiel
dans le domaine social et de la santé publique**



PUBLIC HEALTH COMMITTEE

**COMMITTEE OF EXPERTS ON MATERIALS COMING INTO
CONTACT WITH FOOD**

**POLICY STATEMENT
CONCERNING
PAPER AND BOARD MATERIALS AND ARTICLES
INTENDED TO COME INTO CONTACT WITH FOODSTUFFS**

**Version 1
(19.12.2002)**

NOTE TO THE READER

The following documents are part of the Council of Europe's policy statement concerning paper and board materials and articles intended to come into contact with foodstuffs:

- Resolution AP (2002) 1 on paper and board materials and articles intended to come into contact with foodstuffs
- Technical document No 1: List of substances used in the manufacture of paper and board materials and articles intended to come into contact with foodstuffs (under preparation)
- Technical document No 2: Guidelines on test conditions and methods of analysis for paper and board materials and articles intended to come into contact with foodstuffs
- Technical document No 3: Guidelines on paper and board materials and articles, made from recycled fibres, intended to come into contact with foodstuffs
- Technical document No 4: CEPI Guide for good manufacturing practice for paper and board for food contact, prepared by CEPI
- Technical document No 5: Practical Guide for users of Resolution AP (2002) 1 on paper and board materials included to come into contact with foodstuffs (under preparation)

It is underlined that the resolution and the technical documents form a whole and should be read in conjunction with each other.

Resolution AP (2002) 1 was adopted by the Committee of Ministers on 18 September 2002 at the 808th meeting of the Ministers' Deputies.

The Technical documents N° 2, 3 and 4 were adopted by the Public Health Committee at the 69th session on 17 June 2002.

The present document includes further a Mission Statement concerning the role of the Council of Europe's Committee of Experts on materials coming into contact with food.

Documents may be consulted on the Internet website of the Partial Agreement Department in the Social and Public Health Field (under preparation):

www.coe.int/soc-sp

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MISSION STATEMENT

COUNCIL OF EUROPE AND FOOD CONTACT MATERIALS

1. Council of Europe

The Council of Europe is a political organisation which was founded on 5 May 1949 by ten European countries in order to promote greater unity between its members. It now numbers 44 member States¹.

The main aims of the Organisation are to reinforce democracy, human rights and the rule of law and to develop common responses to political, social, cultural and legal challenges in its member States. Since 1989 the Council of Europe has integrated most of the countries of Central and Eastern Europe into its structures and supported them in their efforts to implement and consolidate their political, legal and administrative reforms.

The work of the Council of Europe has led, to date, to the adoption of over 170 European conventions and agreements, which create the basis for a common legal space in Europe. They include the European Convention on Human Rights (1950), the European Cultural Convention (1954), the European Social Charter (1961), the European Convention on the Prevention of Torture (1987) and the Convention on Human Rights and Bioethics (1997). Numerous recommendations and resolutions of the Committee of Ministers propose policy guidelines for national governments.

The Council of Europe has its permanent headquarters in Strasbourg (France). By statute, it has two constituent organs: the Committee of Ministers, composed of the Ministers of Foreign Affairs of the 44 member States, and the Parliamentary Assembly, comprising delegations from the 44 national parliaments. The Congress of Local and Regional Authorities of Europe represents the entities of local and regional self-government within the member States. A multinational European Secretariat serves these bodies and the intergovernmental committees.

2. The Partial Agreement in the social and public health field

Where a lesser number of member states of the Council of Europe wish to engage in some action in which not all their European partners desire to join, they can conclude a 'Partial Agreement' which is binding on themselves alone.

The Partial Agreement in the social and public health field was concluded on this basis in 1959.

¹ Albania, Andorra, Armenia, Austria, Azerbaijan, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Moldova, The Netherlands, Norway, Poland, Portugal, Romania, Russian Federation, San Marino, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, "the former Yugoslav Republic of Macedonia", Turkey, Ukraine, United Kingdom of Great Britain and Northern Ireland.

The areas of activity of the Partial Agreement in the social and public health field include two sectors:

- Protection of public health
- Rehabilitation and integration of people with disabilities.

At present, the Partial Agreement in the public health field has 18 member states¹.

The activities are entrusted to committees of experts, which are responsible to a steering committee for each area.

The work of the Partial Agreement committees occasionally results in the elaboration of conventions or agreements. The more usual outcome is the drawing-up of resolutions of member states, adopted by the Committee of Ministers. The resolutions should be considered as statements of policy for national policy-makers. Governments have actively participated in their formulation. The delegates to the Partial Agreement committees are both experts in the field in question and responsible for the implementation of government policy in their national ministries.

The procedure provides for considerable flexibility in that any state may reserve its position on a given point without thereby preventing the others from going ahead with what they consider appropriate. Another advantage is that the resolutions are readily susceptible to amendment should the need arise. Governments are furthermore called upon periodically to report on the implementation of the recommended measures.

A less formal procedure is the elaboration of guidelines intended to serve as requirements or models for member states and industry.

Bodies of the Partial Agreement in the social and public health field enjoy close co-operation with equivalent bodies in other international institutions, in particular the Commission of the European Union. Contact is also maintained with international non-governmental organisations (NGOs) and industry, working in similar or related fields.

3. Council of Europe committees in the public health field

- Public Health Committee (Steering Committee)
- Committee of experts on materials coming into contact with food

Ad hoc Groups of the Committee of experts:

- Ad hoc Group on safety evaluation of food contact substances
- Ad hoc Group on recycled fibres
- Ad hoc Group on test conditions for paper and board
- Ad hoc Group on tissue papers
- Ad hoc Group on packaging inks
- Ad hoc Group on coatings

¹ Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, The Netherlands, Norway, Portugal, Slovenia, Spain, Sweden, Switzerland, United Kingdom of Great Britain and Northern Ireland.

- Ad hoc Group on cork
- Ad hoc Group on rubber
- Ad hoc Group on lead leaching from glass

- Committee of experts on nutrition, food safety and consumer health

Ad hoc Groups of the Committee of experts:

- Ad hoc Group on nutrition in schools
- Ad hoc Group on food supplements
- Ad hoc Group on stored product protection

- Committee of experts on flavouring substances
- Committee of experts on cosmetic products
- Committee of experts on pharmaceutical questions
- Committee of experts on medicines subject to prescription

4. Terms of reference of the Committee of experts on materials coming into contact with food

The overall aim of the Council of Europe Partial Agreement public health activities is to raise the level of health protection of consumers and food safety in its widest sense.

The terms of reference of the Committee of experts on materials coming into contact with food (hereafter called 'Committee of experts') are part of the overall aim of these activities and are related to precise problems concerning food contact materials and articles.

The representatives of the Partial Agreement member states and delegates of the Committee of experts are both experts in the field of food contact materials and responsible for the implementation of government policies in their national ministries.

The Commission of the European Union has a particular status of participation within the Committee of Experts.

European industry branch associations are not entitled to send representatives to the meetings of the Committee of Experts. They may be represented at the level of the Ad hoc Groups, which are advisory bodies to the Committee of experts. Ad hoc Groups are not entitled to take formal decisions.

Hearings are regularly organised between the Committee of experts and the European industry branch associations on specific questions related to the work programme.

5. Main tasks of the Committee of experts on materials coming into contact with food

▪ Elaboration of resolutions

Resolutions elaborated by the Committee of experts are approved by the Public Health Committee and adopted by the Committee of Ministers¹;

They have to be considered as statements of policy or statements for national policy-makers of the Partial Agreement member states to be taken into account in the national laws and regulations on food contact materials and articles, with the view of harmonising regulations at European level.

Resolutions lay down the field of application, the specifications and the restrictions concerning the manufacture of food contact materials and articles.

If necessary, they are amended in order to update their content.

▪ Elaboration of guidelines

Guidelines, set out in Technical documents, are approved by the Committee of experts and adopted by the Public Health Committee. They are not submitted to the Committee of Ministers.

They have to be considered as requirements to be taken into account in the context of resolutions or as models for the implementation of national policies.

They provide practical guidance for the application of resolutions and/or lay down technical and/or scientific specifications for the manufacture of food contact materials and articles.

If necessary, guidelines are amended in the light of technical or scientific developments of manufacturing processes and techniques of food contact materials and articles.

Typical examples of guidelines are:

- List of substances to be used for the manufacture of food contact materials
- Test conditions and methods of analysis
- Good manufacturing practices (GMP)

¹ The Committee of Ministers is the Council of Europe's political decision-making body. It comprises the Ministers for Foreign Affairs of the forty-four member states, or their permanent diplomatic representatives in Strasbourg. It monitors member states' compliance with their undertakings. Resolutions of the Partial Agreement in the social and public health field are adopted by the Committee of Ministers restricted to Representatives of the member states of the Partial Agreement.

- **Safety evaluations of substances to be used in food contact materials and articles**

Safety evaluations of substances to be used in food contact materials and articles are carried out by the ad hoc Group on safety evaluation of food contact substances and submitted for approval to the Committee of experts and adoption to the Public Health Committee. They are not forwarded to the Committee of Ministers.

The Committee of experts has agreed to give priority to the safety evaluations of paper and board substances used for the manufacture of food contact paper and board materials.

- **Elaboration of opinions**

On request by the Committee of Ministers and/or the Public Health Committee, the Committee of experts elaborates opinions on specific questions related to food contact materials and articles.

**RESOLUTION AP (2002) 1
ON
PAPER AND BOARD MATERIALS AND ARTICLES INTENDED
TO COME INTO CONTACT WITH FOODSTUFFS**

COUNCIL OF EUROPE
COMMITTEE OF MINISTERS

(PARTIAL AGREEMENT IN THE SOCIAL AND PUBLIC HEALTH FIELD)

RESOLUTION AP (2002) 1

ON

**PAPER AND BOARD MATERIALS AND ARTICLES
INTENDED TO COME INTO CONTACT WITH FOODSTUFFS**

*(adopted by the Committee of Ministers on 18 September 2002
at the 808th meeting of the Ministers' Deputies)*

The Committee of Ministers, in its composition restricted to the Representatives of Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, The Netherlands, Norway, Portugal, Slovenia, Spain, Sweden, Switzerland and the United Kingdom, member states of the Partial Agreement in the Social and Public Health Field,

Recalling Resolution (59) 23 of 16 November 1959, concerning the extension of the activities of the Council of Europe in the social and cultural fields;

Having regard to Resolution (96) 35 of 2 October 1996, whereby it revised the structures of the Partial Agreement and resolved to continue, on the basis of revised rules replacing those set out in Resolution (59) 23, the activities hitherto carried out and developed by virtue of that resolution; these being aimed in particular at:

a. raising the level of health protection of consumers in its widest sense, including a constant contribution to harmonising – in the field of products having a direct or indirect impact on the human food chain as well as in the field of pesticides, pharmaceuticals and cosmetics – legislation, regulations and practices governing, on the one hand, quality, efficiency and safety controls for products and, on the other hand, the safe use of toxic or noxious products;

b. integrating people with disabilities into the community; defining – and contributing to its implementation at European level – of a model of coherent policy for people with disabilities, which takes account simultaneously of the principles of full citizenship and independent living; contributing to the elimination of barriers to integration, whatever their nature, whether psychological, educational, family-related, cultural, social, professional, financial or architectural;

Having regard to the action carried out for several years for the purposes of harmonising their legislation in the public health field and, in particular, with regard to paper and board materials and articles intended to come into contact with foodstuffs;

Considering that paper and board materials and articles intended to come into contact with foodstuffs may, by reason of migration of paper and board constituents to the foodstuffs, pose under certain conditions a risk to human health;

Emphasising the fact that this resolution and the technical documents on paper and board materials and articles intended to come into contact with foodstuffs form a whole and should be read in conjunction with each other.

Taking the view that each member state, faced with the need to introduce regulations governing this matter, would find it beneficial to harmonise such regulations at European level,

Recommend to the governments of the member states of the Partial Agreement in the Social and Public Health field to take into account in their national laws and regulations on paper and board materials and articles intended to come into contact with foodstuffs the principles set out hereafter.

APPENDIX TO RESOLUTION AP (2002) 1

1. Field of application

This resolution applies to materials and articles constituted of paper and board (excluding nonwovens¹) which may comprise one or more layer(s) of fibres and are intended to come into contact with or are placed in contact with foodstuffs. A plastic layer, or a layer of any other material, such as aluminium, waxes or paraffins applied to the paper and board is excluded from this resolution². When the materials and articles consist of two or more layers, exclusively or not exclusively made of paper and board, any layer which is composed of paper and board must fulfil the requirements of this resolution, unless separated from the foodstuffs by a functional barrier³ to migration.

Filtering layers of high grammage⁴ and consisting to a large extent of non-fibrous material as well as tissue paper kitchen towels and napkins are excluded from the field of application of the present resolution.⁵

2. Definition

Paper and board are manufactured from cellulose-based natural fibres from bleached and unbleached fibre material. Recycled fibre materials may also be used in accordance with the 'Guidelines on paper and board materials and articles, made from recycled fibres, intended to come into contact with foodstuffs', set out in Technical document No. 3. In addition paper and board may contain functional additives and synthetic fibres⁶. Paper and board may also contain other treatment agents and polymeric binders for organic and inorganic pigments.

3. Specifications

¹ As defined by ISO 9092.

² Examples: Mineral coated papers and their components, including polymeric binders in the coating formula, are subject to this resolution. The plastic layer, or a layer of any other material, such as aluminium, waxes or paraffins in contact with foodstuffs, of a coated or laminated paper is excluded from this resolution. The paper behind the layer is not subject to this resolution if it can be shown that the layer is a functional barrier.

³ A functional barrier is any integral layer which under its normal or foreseeable conditions of use reduces all possible material transfers (permeation and migration) from any layer beyond the barrier into food to a toxicologically and organoleptically insignificant and to a technologically unavoidable level.

⁴ Products with a weight to surface area ratio of 500 g/m² and above (BgVV Chapter XXXVI/1 - Papers and filter beds for use in boiling and hot-filtering).

⁵ Tissue paper kitchen towels and napkins are covered by specific guidelines.

⁶ Synthetic fibres should comply with EU Directive 90/128/EEC.

3.1. Paper and board used for all food contact applications under normal or foreseeable conditions of use should meet the following conditions:

3.2. They should not transfer their constituents to foodstuffs in quantities which could endanger human health or bring about an unacceptable change in the composition of the foodstuffs or a deterioration in the organoleptic characteristics thereof, in accordance with Article 2 of Directive 89/109/EEC.

3.3. They should be manufactured in accordance with the 'CEPI guide for good manufacturing practice for paper and board for food contact' set out in Technical document No. 4 and using the substances of the 'List of substances used in the manufacture of paper and board materials and articles intended to come into contact with foodstuffs' set out in Technical document No. 1 and according to the conditions specified.

3.4. They should be of suitable microbiological quality, taking into account the intended end use of the material. For materials and articles intended to come into contact with aqueous and/or fatty foodstuffs, particular attention should be paid to pathogens.

3.5. They should not release substances which have an antimicrobial effect on foodstuffs. The method of analysis to be applied is laid down in the 'Guidelines on test conditions and methods of analysis for paper and board materials and articles intended to come into contact with foodstuffs' set out in Technical document No 2.

3.6. They should comply with the restrictions laid down in Table 1 and Table 2 hereafter and with either the QM¹ or SML restrictions² laid down in the 'List of substances used in the manufacture of paper and board materials and articles intended to come into contact with foodstuffs' set out in Technical document No. 1.

¹ The restrictions in Table 1 of this resolution and of the 'List of substances used in the manufacture of paper and board materials and articles intended to come into contact with foodstuffs' set out in Technical document No. 1, expressed as QM (maximum permitted quantity of the substance in the finished material or product expressed as mg per dm² of the surface in contact with foodstuffs), have been derived from guideline levels laid down in Council of Europe Resolution AP (96) 4 on maximum and guideline levels and on source-directed measures aimed at reducing the contamination of food by lead, cadmium and mercury and from the SML (specific migration limit) restrictions as laid down in EU Directives, respectively, based on toxicological assessment, applying the conventional ratio of 6 dm² of material coming into contact with 1 kg of foodstuffs and assuming 100 % migration. For contact conditions where the mass of food to contact area ratio differs from the conventional ratio of 1 kg to 6 dm², the QM restriction to be applied should be calculated as specified in the 'Guidelines on test conditions and methods of analysis for paper and board materials and articles intended to come into contact with foodstuffs' set out in Technical document No. 2.

² The SML restrictions are those set by the Commission of the European Communities in its directives relating to plastic materials intended to come into contact with foodstuffs.

Table 1 - Restriction limits (QM) for cadmium, lead and mercury

<i>Substance</i>	<i>Restriction QM limit (mg/dm² paper and board)</i>
Cadmium	0.002
Lead	0.003
Mercury	0.002

Table 2 - Restriction limit for pentachlorophenol

<i>Substance</i>	<i>Purity requirement (mg/kg paper and board)</i>
Pentachlorophenol	0.15

3.7. Verification of compliance with the quantitative restrictions should to be carried out according to the conditions laid down in the 'Test conditions and methods of analysis for paper and board materials and articles intended to come into contact with foodstuffs' set out in Technical document No. 2.

3.8. Testing for compliance with the restrictions in Table 1 is not required for paper and board materials and articles intended to come into contact with dry foodstuffs or foodstuffs which are to be shelled, peeled or washed.

3.9. If it can be shown by calculation, taking into account the conditions of manufacture, that the restrictions laid down in the 'List of substances used in the manufacture of paper and board materials and articles intended to come into contact with foodstuffs' set out in Technical document No. 1, cannot be exceeded, no testing for compliance with these restrictions is necessary.

3.10. Paper and board produced with recycled fibres can be used as food contact material if it originates from specified qualities of recovered paper and board which has been subjected to appropriate processing and cleaning, provided that the finished materials comply with the specifications in this resolution and with the 'Guidelines on paper and board materials and articles, made from recycled fibres, intended to come into contact with foodstuffs' set out in Technical document No 3.

3.11. Manufacturers of paper and board for food contact applications should make sure that they use raw materials produced by processes which reduce dioxins (polychlorinated dibenzodioxins and dibenzofurans) to levels as low as reasonably achievable.

References:

Council Directive of 21 December 1988 on the approximation of the laws of the Member States relating to materials and articles intended to come into contact with foodstuffs (89/109/EEC). Official Journal of the European Communities L40 11.2.89.

Council of Europe Resolution AP (96) 4 on maximum and guideline levels and on source-directed measures aimed at reducing the contamination of food by lead, cadmium and mercury. Adopted by the Committee of Ministers on 2 October 1996.

ISO 9092: 1988. Textiles - Nonwovens - Definition.

TECHNICAL DOCUMENT No. 2

**GUIDELINES ON TEST CONDITIONS AND METHODS OF ANALYSIS
FOR PAPER AND BOARD MATERIALS AND ARTICLES
INTENDED TO COME INTO CONTACT WITH FOODSTUFFS**

**Version 1
(19.12.2002)**

GUIDELINES ON TEST CONDITIONS AND METHODS OF ANALYSIS

1. Introduction

This document gives guidance on the conditions to be used for testing paper and board intended to come into contact with foodstuffs. It should be read in conjunction with the specifications laid down in Resolution AP (2002) 1 on paper and board materials and articles intended to come into contact with foodstuffs.

The conditions for testing compliance with SML restrictions are based on tests as laid down for plastic materials and articles in EU Directives, as referenced. It is recognised that these test conditions may, in some cases, not be appropriate for testing paper and board intended to come into contact with foodstuffs, due to the nature of the material or its conditions of use. In these instances, alternative tests can be applied which are more appropriate for the material under consideration, taking into account the normal or foreseeable use of the material.

A list of current European and International Standard methods for testing is given in Section 8 of this document. Further standards are being elaborated by CEN TC 172 and ISO TC 6.

Where no standard method currently exists, the best available recognised method of analysis should be applied.

A chapter describing the present views about functional barrier is included in this document for information.

2. Testing for compliance with the restrictions laid down in Table 1 and Table 2 of Resolution AP (2002) 1 on paper and board materials and articles intended to come into contact with foodstuffs

Testing for compliance with the QM restrictions in Table 1 of this resolution should measure the total concentration of a substance in the paper. The substance can be measured *in situ* or by total release of the substance by extraction from the material or by degradation of the paper matrix.

Testing for compliance with the purity restriction for pentachlorophenol of Table 2 of this resolution can be made using a method based on extraction of the total amount in the paper.

3. Testing for compliance with the restrictions laid down in the 'List of substances used in the manufacture of paper and board materials and articles intended to come into contact with foodstuffs'

3.1. Testing for QM restrictions

Testing for compliance with the QM restrictions (mg/dm^2) laid down in the 'List of substances used in the manufacture of paper and board materials and articles intended to come into contact with foodstuffs' set out in Technical document No. 1 should measure the total concentration of a substance in the paper.

3.2. SML restrictions

3.2.1. Testing for SML restrictions

In principle, testing for compliance with the SML restrictions laid down in the 'List of substances used in the manufacture of paper and board materials and articles intended to come into contact with foodstuffs' set out in Technical document No 1 should be carried out by migration testing, using the conventional conditions. However, in order to determine compliance with the SML restrictions laid down in the Technical document No. 1, extraction tests could be used if, on the basis of scientific evidence, the results obtained using these tests are at least equal to those obtained by migration testing using the conventional EU test simulants or foodstuffs.

3.2.2. Migration tests

Where migration or extraction tests are used to determine compliance with restrictions expressed as SML, EU Directive 82/711/EEC, as amended by Directive 97/48/EC should be used for guidance on the selection of appropriate simulants and exposure conditions (time and temperature).

Testing should take into account the worst foreseeable conditions of use for the material. This will include the type of foodstuff with which the paper comes into contact, and the time and temperature of contact.

Where paper will contact dry foodstuffs only, migration testing should be carried out using modified polyphenylene oxide as a test medium, using the appropriate conventional conditions for migration tests with food simulants as laid down in Table 3 of EU Directive 97/48/EC.

3.2.3. Extraction tests

For extraction testing, an appropriate extraction medium should be used under contact conditions in such a way that the requirement noted in Section 3.2.1 is fulfilled.

4. Contact conditions differing from the conventional ratio of 1 kg to 6 dm²

For contact conditions where the mass of food to contact area ratio differs from the conventional ratio of 1 kg food to 6 dm² of paper, the QM restriction to be applied is calculated as follows:

$$QM_{nor} = \frac{QM_{std}}{CA_{nor}} \times 6 \times m$$

Where: QM_{nor} is the QM restriction to be applied taking into account the conditions under normal or worst foreseeable conditions of use;

QM_{std} is the QM restriction under the conventional conditions of 1 kg to 6 dm²;

m is the mass of food (in kg) under normal or worst foreseeable conditions of use;

CA_{nor} is the contact area (in dm²) under normal or worst foreseeable conditions of use.

5. Speciality papers

5.1. Paper for use at high temperature, such as baking paper

For migration testing, the basic rules given in Directive 97/48/EC should be applied taking into account the type of foodstuff with which the paper comes into contact, and the time and temperature of contact.

When carrying out extraction testing to determine compliance with the QM or SML restrictions laid down in the 'List of substances used in the manufacture of paper and board materials and articles intended to come into contact with foodstuffs' set out in Technical document No 1, testing should take into account possible degradation products formed at elevated temperature.

5.2. Paper intended for contact with hot, aqueous liquids, such as tea bags, coffee filters and cooking pouches

If migration testing is carried out, the appropriate conditions (time, temperature and ratio of paper to liquid) should be chosen taking into account the intended use of the material.

If extraction testing is carried out to determine compliance, hot water extracts should be prepared.

5.3. Paper used for filtering large volumes of liquid such as filters for industrial use and milk filters

5.3.1. Migration tests

Where the total volume to be filtered is from 1 to 10 l/ dm² of paper, before testing, 0,5 l of the food or food simulant per dm² should be passed through the test material and discarded. A further portion, 0,5 l/ dm², of the food or food simulant should then be passed through the material and analysed to obtain the test result.

Where the total volume to be filtered is above 10 l/ dm² of paper, before testing, one litre of the food or food simulant per dm² should be passed through the test material and discarded. A further portion, 1 l/ dm², of the food or food simulant should then be passed through the food material and analysed to obtain the test result.

5.3.2. Extraction tests and tests for QM

For testing compliance with a QM restriction, or when using extraction tests to determine compliance with an SML restriction, the material should be tested directly after the first 0,5 l/ dm² has been passed through the material and discarded.

6. Methods of analysis

The best available recognised methods of analysis should be applied. A list of current European and International Standards is given below:

- Determination of pentachlorophenol (EN 15320 in preparation);
- Determination of cadmium, lead and chromium in aqueous extract (EN 12498)
NB. This method is appropriate for non-acidic foodstuffs;
- Determination of mercury in aqueous extract (EN 12497);
NB. This method is appropriate for non-acidic foodstuffs;
- Preparation of a cold water extract (EN 645);
- Preparation of a hot water extract (EN 647);
- Sensory analysis. Part 2: Off flavour (taint) (EN 1230:2);
- Determination of microbiological properties. Part 1: Total bacteria count (ISO 8784-1);
- Determination of dry matter content in an aqueous extract (EN 920);
- Determination of colour fastness of dyed paper and board (EN 646);
- Determination of the fastness of fluorescent whitened paper and board (EN 648);
- Determination of formaldehyde in an extract (EN 1542);
- Determination of antimicrobial constituents (EN 1104);
- Migration into polyphenylene oxide (CEN testing protocols in preparation).

For testing for compliance with restrictions for other substances the best available method should be chosen.

7. Functional barrier

The functional barrier is defined in Resolution AP (2002) 1 on paper and board materials and articles intended to come into contact with foodstuffs as “any integral layer which under its normal or foreseeable conditions of use reduces all possible materials transfer (permeation and migration) from any layer beyond the barrier into food to a toxicologically and organoleptically insignificant and to a technologically unavoidable level”.

Whether a barrier can be considered as functional should be judged from case to case.

There are for the time being no agreed methods to test a barrier material for functional properties. Based on current research the most common procedure is by adding contaminants or substitutes to the layer behind the barrier material and performing migration tests with the barrier in contact with food or food simulants. Further research is in progress.

8. References

Council Directive of 18 October 1982 laying down the basic rules necessary for testing migration of the constituents of plastic materials and articles intended to come into contact with foodstuffs (82/711/EEC). Official Journal of the European Communities L297/26, 23.10.82.

Council Directive of 19 December 1985 laying down the list of simulants to be used for testing migration of constituents of plastic materials and articles intended to come into contact with foodstuffs (85/572/EEC). Official Journal of the European Communities L372/14, 31.12.85.

Commission Directive of 29 July 1997 amending for the second time Council Directive 82/711/EEC laying down the basic rules necessary for testing migration of the constituents of plastic materials and articles intended to come into contact with foodstuffs (97/48/EC). Official Journal of the European Communities L222/10, 12.8.97.

Council of Europe Resolution AP (96) 4 on maximum and guideline levels and on source-directed measures aimed at reducing the contamination of food by lead, cadmium and mercury, adopted by the Committee of Ministers on 2 October 1999.

TECHNICAL DOCUMENT No. 3

**GUIDELINES ON PAPER AND BOARD
MATERIALS AND ARTICLES, MADE FROM RECYCLED FIBRES,
INTENDED TO COME INTO CONTACT WITH FOODSTUFFS**

**Version 1
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GUIDELINES ON PAPER AND BOARD MATERIALS AND ARTICLES, MADE FROM RECYCLED FIBRES, INTENDED TO COME INTO CONTACT WITH FOODSTUFFS

1. Introduction

The Guidelines on paper and board materials and articles, made from recycled fibres, intended to come into contact with foodstuffs are for the guidance of the enforcement authorities, manufacturers and users in order to ensure that the use of the end-product does not constitute a risk to health in accordance with Article 2 of EU Framework Directive 89/109/EEC.

Paper and board made in part or in full from recycled fibres intended to come into contact with foodstuffs should comply with the requirements of Resolution AP (2002) 1 on paper and board materials and articles intended to come into contact with foodstuffs and related technical documents. However such paper and board should be subject to some additional requirements to ensure their safety in use due to the presence in the feedstock of constituents of printing inks, adhesives and other substances, e.g. from paper not intended for food contact.

In order to ensure the safety of the end product the following aspects should be considered together:

- the source of recovered paper and board;
- the processing technologies applied to remove contaminants;
- the intended end use of the product.

These aspects are basic elements of product safety assurance.

As further elements of product safety assurance, tests should be carried out where appropriate or advisable as a matter of prudence, to determine the presence of specific substances in the end-product.

The Guidelines will be amended, as necessary, by the Committee of experts on materials coming into contact with food, to take account of technological developments in the processing of recovered paper, improvements in analytical techniques and increased knowledge of the toxicology of chemical substances.

2. Good manufacturing practice

Good manufacturing practice (GMP) is a fundamental part of quality control and product safety assurance.

Basic elements of GMP include:

- Availability of production manuals and instructions;
- Compliance with specified quality requirements for raw materials;
- Appropriate storage and handling conditions;
- The application of processes to avoid or remove contamination;
- Specifications for end-product testing;
- Information to ensure traceability and to maintain production records.

Some of these basic elements, which are particularly important for the production of paper and board made from recycled fibres intended to come into contact with foodstuffs, are covered in Chapters 3, 5 and 6 of the Guidelines.

Furthermore, see also the 'CEPI guide for good manufacturing practice for paper and board for food contact' set out in Technical document No. 4.

3. Recovered paper groups

The aim of this chapter is to define the groups of recovered paper and board that can be used as raw materials in the manufacture of paper and board intended to come into contact with foodstuffs, as well as those groups of recovered paper and board which cannot be used as raw materials. These groups are defined in relation to the potential contaminants which could be present, so as to assist the selection and processing of raw materials as part of Good manufacturing practice (see Technical document No. 4).

The groups of recovered paper listed below are defined in generic terms for the purpose of the Guidelines. Where industry use other definitions such as their own specifications or, for example, the nomenclature in EN 643:2001 some of which are listed below for illustrative purposes, they should ensure correspondence with the groups below.

3.1. Recovered paper for use as raw materials

The descriptions within each group are given as examples. Where applicable, some grades listed in EN 643:2001 are indicated.

Group 1

Paper and board manufactured with substances of the 'List of substances used in the manufacture of paper and board materials and articles intended to come into contact with foodstuffs' set out in Technical document No. 1.

Unprinted cuttings, shavings, sheets and rolls from food contact paper and board based on virgin fibres.

Group 2

Paper and board which may be manufactured with substances not mentioned in the 'List of substances used in the manufacture of paper and board materials and articles intended to come into contact with foodstuffs' set out in Technical document No. 1, unprinted or lightly printed or lightly coloured¹.

Unprinted cuttings, shavings, sheets and rolls of printing and writing papers (EN 643:2001-3.14, 3.15, 3.16, 3.17, 3.18, 3.19);

¹ Lightly printed: Papers where the ratio of printed area to unprinted area is very small. Examples of lightly printed papers are shavings and cuttings, not mixed with misprinted sheets, originating from printing shops.

Lightly coloured: Papers where only shading dyestuffs have been added during manufacture.(For example yellow pages in telephone directories are not considered as lightly coloured.)

Lightly printed or coloured cuttings, shavings, sheets and rolls of printing and writing papers (EN 643:2001- 2.03, 3.01, 3.02, 3.03, 3.04, 3.09);

White writing and printing paper originating from offices (EN 643:2001 - 3.05);

White continuous stationery paper (computer paper) (EN 643:2001 - 3.07);

Unprinted or lightly printed, unused kraft paper (EN 643:2001- 4.07, 4.08);

Unprinted or lightly printed, unused packages (EN 643:2001 - 3.12, 3.13, 4.05);

Unused kraft sacks and wrappings.

Group 3

Printed paper and board, corrugated board from supermarkets, paper and board from households and industry.

Printed or coloured material from printing shops, over-issues etc. (EN 643:2001 - 1.06, 2.02, 2.04, 2.07, 3.08, 3.11);

Unsorted white and coloured writing and printing paper originating from offices;

Boxes and sheets of corrugated board collected from supermarkets (EN 643:2001 - 1.04, 1.05);

Unused boxes and sheets of corrugated board (EN 643:2001 - 4.01);

Printed paper from households, such as newspaper, pamphlets, magazines, catalogues etc. (EN 643:2001 - 1.11);

Mixed papers and board from households (EN 643:2001 - 1.02, 5.01);

Sheets, boxes and cases of solid and corrugated board and folding boxboard from households.

3.2. Recovered paper and board not for use as raw materials

Contaminated waste paper and board from hospitals;

Recovered paper and board which has been mixed with garbage and subsequently sorted out;

Used stained sacks which have contained for example chemicals and foodstuffs;

Covering materials, such as paper used for covering furniture during repair and painting work;

Batches mainly consisting of carbonless copy paper;

Waste paper from households containing used hygienic paper, such as used kitchen towels, handkerchiefs and facial tissue;

Old archives from libraries, offices etc., if they contain PCBs.

4. Foodstuff types

4.1. Classification of foodstuff types

Foods have been classified into 3 types, taking into account the nature of the food and the potential for migration in contact with paper and board. The classification laid down in EU Directive 85/572/EEC should be used to determine the food type for individual foodstuffs except where Chapter 4 of the Guidelines indicates otherwise.

4.1.1. Type I - Aqueous and/or fatty foodstuffs

Aqueous foods range from those which are liquid to those which are solid but have a high to medium water content. Examples of liquid foodstuffs include beverages and water. Examples of solid foods with a high to medium water content include fresh fish, shellfish, meat and some cheeses.

Fatty foods range from those which are fully fatty to those which are solid, with a low to medium moisture content but which have fat on the surface. Example of the former include animal and vegetable fats. Examples of the latter include pastry products, pizzas, hamburgers, cheeses and chocolate.

Frozen foods of Type I can be considered to be dry, non-fatty of Type II provided that the food is not defrosted in contact with paper and board.

4.1.2. Type II - Dry, non-fatty foodstuffs

Foodstuffs which are dry or with low moisture content and which do not have fat on the surface. Examples of such foods include sugar, pulses, some bakery wares, salt, tea and spices.

Type II foodstuffs, e.g. bread, which come into contact with paper and board at temperatures above room temperature, e.g. in microwave or conventional ovens, should be considered as Type I foodstuffs.

Frozen foodstuffs of Type II are considered to be foodstuff Type I if they are defrosted in contact with paper and board.

4.1.3. Type III - Foodstuffs which are shelled or peeled or washed before consumption

Examples of Type III foodstuffs are fruits, berries¹, vegetables, nuts and potatoes.

¹ The Danish delegation expressed reservations that berries be included as Type III foodstuffs. It was of the opinion that berries should be considered as Type I foodstuffs.

5. Current process technologies and their purpose

This chapter describes current process technologies applied to the raw materials taking into account the intended use of the end-product. It deals with the processes applied to the recovered paper at the fibre preparation stage. Papermaking processes are not covered. The information in this chapter is based on current technical knowledge and should be reviewed in the light of technological developments. It is recognised that the groups of recovered paper defined in Chapter 3 of the Guidelines differ in their potential for chemical and microbiological contamination of foodstuffs depending on the intended use of the end-product. Recycling process technologies should be adequate to counter this potential for contamination without imposing unnecessary restrictions. The most efficient processes should therefore be applied where necessary. The use of chemical reagents, the effects of washing together with process water treatments, and temperature controls provide some of the means for achieving chemical decontamination of raw materials.

These process technologies, which are summarised in Table 1 of Chapter 5 of the Guidelines and defined in Appendix 1 below should be seen in the context of the Consolidated matrix of Chapter 7 of the Guidelines. They link raw materials to the intended use of the end-product, and to the wider context of Good manufacturing practice (see Technical document No. 4).

5.1. Types of process

5.1.1. Mechanical cleaning

Repulping, deflaking cleaning and screening are examples of mechanical cleaning and they are intended to remove physical impurities. However, their impact on chemical contamination is significant, and is due to the dilution effect since these processes are carried out at low consistency. Low size components such as fillers and “fines” (fine fibre fraction) are released in the process water, and may be removed at subsequent stages. In addition the level of insoluble contaminants is reduced at this stage. It must be emphasised that part of the process water, including dissolved and suspended material, is not re-used in the recycling plant, but is rejected to the wastewater treatment plant.

5.1.2. Washing

Washing is carried out by successively lowering the consistency by dilution and increasing by thickening. Some processes are best carried out at high consistency for mechanical and energy efficiency reasons, such as dispersion. Some screening and cleaning has to take place prior to this stage at a low consistency, which means that a thickening stage is employed. Normally, this is carried out by squeezing out excess water, for example in a screw press, belt press or drum filter. Water-soluble contaminants are dissolved and may be removed if adequate process water treatments are used.

5.1.3. De-inking by washing or flotation

De-inking may be carried out either by washing or by flotation. The purpose of de-inking is to remove ink from printed material. Together with ink particles, some dissolved and colloidal contaminants are removed. Surface-active agents, such as soaps, are used to help separation.

5.1.4. Thermal treatment

This stage is carried out at high consistency. The fibres are subjected to high mechanical forces together with a steam treatment, generally at temperatures of 60° C, but temperatures of 140 °C may be applied. This process is called hot dispersion and it can be combined with a chemical treatment by adding chemicals. Thermal treatment reduces the level of chemical and microbiological contamination.

5.1.5. Chemical treatment

Chemical treatment may be carried out together with hot dispersion. Generally used chemicals are hydrogen peroxide, formamidine sulfinic acid (FAS) and sodium hydrosulfite.

The purpose of bleaching is to increase the brightness of white grade papers. Generally used chemicals are hydrogen peroxide, FAS, sodium hydrosulfite, ozone and oxygen.

Process water treatment aims at controlling microbiological activity. It includes the use of biocides, slimicides and enzymes.

The purpose of process water clarification is to remove suspended solids and colloidal materials from the water to be re-circulated in order to provide water of a suitable quality to be re-used back in the process. It avoids recontamination at dilution stages.

Chemical treatments reduce the level of chemical and microbiological contamination.

TABLE 1 - CURRENT PROCESS TECHNOLOGIES AND THEIR PURPOSE

Unit operation	Type of process	Consistency (%)	Equipment / Use of chemicals	Purpose / Efficiency
Repulping	Mechan. cleaning	5 – 15	Pulper Use of alkali and/or peroxide (in de-inking lines)	Separation of fibres from each other, from fillers and other non-fibre components Ink detachment
Deflaking	Mechan. cleaning	5 – 15	Deflaker	Disintegration of fibre flakes into fibres Ink detachment
Pre-cleaning	Mechan. cleaning	5 – 15	High density cleaner Rotating drum	Removal of coarse, high density contaminants (density > 1): sand, glass, pebble, metal particles
Pre-screening	Mechan. cleaning	4 – 5	Pressurised screens with holes or slots	Removal of coarse, usually lightweight, contaminants: plastic films, textiles, etc., according to their size and shape
De-inking by flotation	De-inking	1 – 1.5	Flotation cells Use of surfactants (soaps)	Removal of ink particles, specks, low size stickies, etc. (sub-millimetre size)
De-inking by washing	De-inking, washing	1 – 1.5	Washer Use of surfactants (soaps)	Removal of ink particles, specks, low size stickies, etc. (sub-millimetre size)
Washing	Washing	1 – 1,5	Washer	Removal of specks, low size stickies, etc. (sub-millimetre size), of soluble and colloidal material
Fine cleaning	Mechan. cleaning	0.7 – 1	Cleaner Hydrocyclone	Removal of ink particles, residual high density impurities
Fine screening	Mechan. cleaning	0.7 – 4	Pressurised screens with slots or holes	Removal of residual low density impurities according to size and shape (varnishes, sticky agglomerates, ink particles, etc.)
Thickening	Washing	0.7 – 5 15 – 30	Filter drum Screw press	Raise consistency, in particular prior to hot dispersion or bleaching, removal of fillers, dissolved material, fines, etc.
Hot dispersion	Thermal treatment	20 – 30	Disperser (high speed) Kneader (low speed) Use of direct steam and possibly peroxide Temp. 60 – 130°C	Dispersion of visible impurities: ink particles, specks, hot melt adhesives, waxes, etc. Residual ink detachment Microbiological decontamination
Bleaching	Chemicals treatment	15 – 30	Reactors, bleaching towers Oxidising or reducing agents Temp. 60°C	Increase of brightness Removal of dyestuffs and in some cases optical brighteners Microbiological decontamination
Process water treatment	Chemical treatment		Use of biocides, antislimes	Microbiological control of process water
Clarification of recirculated water	Chemical treatment		Coagulation tanks Microflotation cells	Decrease of biological oxygen demand (BOD) and chemical oxygen demand (COD) Coagulation and removal of colloidal material and fillers

6. End-product requirements

The aim of this chapter is to specify the requirements for the end-product and tests to be carried out.

Restrictions laid down in Resolution AP (2002) 1 on paper and board materials and articles intended to come into contact with foodstuffs and related technical documents apply to the end-product. Additional restrictions for the end-product are specified in Table 2 of Chapter 6 of the Guidelines. These additional restrictions are for substances which have the potential to be present in paper made of recycled fibres, and to migrate into foodstuffs at levels which may pose a risk to health. The list is based on current knowledge of chemicals which are found in or could migrate from recycled fibres.

Some of the restrictions for particular substances are based on evaluations by recognised international bodies, e.g. SCF or JECFA. Where restrictions have not yet been established by a recognised body, the requirements in Table 2 of Chapter 6 of the Guidelines have been made on grounds of prudence, to ensure that migration into foods is kept as low as reasonably achievable.

The end-product should be tested in accordance with the procedure specified in the Guidelines on test conditions and methods of analysis for paper and board materials and articles intended to come into contact with foodstuffs set out in Technical document No. 2, in order to ensure compliance with Art. 2 of EU Directive 89/109/EEC.

It is not necessary to carry out specific testing for compliance if there is conclusive evidence, assuming 100% migration based on the content in the end-product or in the raw materials, that the migration of the substances is so low that compliance with Art. 2 of EU Directive 89/109/EEC is ensured.

Tests should be carried out for substances with a demonstrated toxic potential whenever there are grounds to suspect their presence in the end-product.

Chemical or toxicological screening tests for possible unknown toxic substances are desirable. However, at present the implementation of chemical screening tests for unknown substances might not be feasible. Furthermore, the knowledge about the applicability of toxicological screening tests for paper and board is insufficient for the time being although it should be noted that studies are in progress to establish the validity of these tests for paper and board. The use of these chemical or toxicological screening tests on paper and board should be evaluated and should be recommended in the future where necessary, based on new developments and results in this field.

TABLE 2 - SPECIFIC REQUIREMENTS

Substance	Requirements (Food types I and II unless otherwise specified)
Michler's ketone	The migration of this substance should not be detectable in foodstuffs (limit of detection of 0.01 mg/kg foodstuff) Testing required for Food Type I only
4,4'-Bis (diethylamino) benzophenone (DEAB)	The migration of this substance should not be detectable when measured in foodstuffs (limit of detection of 0.01 mg/kg foodstuff) Testing required for Food Type I only
Diisopropylnaphthalenes (DIPNs)	Levels in paper and board should be kept as low as reasonably achievable, to minimise migration into food
Partially hydrogenated terphenyls (HTTP)	Levels in paper and board should be kept as low as reasonably achievable, to minimise migration into food
Phthalates	See EU Directive 90/128/EEC or Synoptic document (convert TDI to SML using convention $TDI \times 60 = SML$ and convert SML to QM using the formula specified in the 'Test conditions and methods of analysis for paper and board materials and articles intended to come into contact with foodstuffs' set out in Technical document No. 2)
Solvents	The volatility of most solvents ensures that they are not present in the finished product. However, industry should take the necessary steps to ensure that residual solvents are reduced to the lowest possible levels in the finished product, so that migration into food does not pose a risk to health

**TABLE 2 - SPECIFIC REQUIREMENTS
(cont'd)**

Substance	Requirements (Food types I and II unless otherwise specified)
Azo colourants	Soluble azo colourants which may cleave to form aromatic amines listed in the proposal for the EU Directive, amending for the 19 th time the Council Directive 76/769/EEC The aromatic amines should not be detectable when measured in paper (limit of detection of 0.1 mg/kg paper) Testing required for Food Type I only
Fluorescent whitening agents (FWA)	The migration of these substances should not be detectable when measured in foodstuffs ¹ Testing required for Food type I only
Primary aromatic amines, suspected to be carcinogenic ²	These substances should not be detectable when measured in paper (limit of detection of 0.1 mg/kg paper) Testing required for Food Type I only
Polycyclic aromatic hydrocarbons (PAH)	The migration of these substances should not be detectable when measured in foodstuffs (limit of detection of 0.01 mg/kg foodstuff)
Benzophenone	Specific migration limit of 0.1 mg/dm ² of paper

¹ Tests should be carried out according to EN 648

² See: proposal for the EU Directive, amending for the 19th time the Council Directive 76/769/EEC, opinions expressed by SCF, IARC and other competent bodies

7. Consolidated matrix

Tests on end-products are necessary where there are actual or potential risks to health. These risks depend on the nature of the recovered paper, the effectiveness and purpose of recycling treatments and the nature of the contact with foodstuffs for the end-product. All of these elements are combined with the requirements in Chapter 6 of the Guidelines.

The process technologies listed in Table 3 of Chapter 7 hereafter provide flexibility to take account of mill-specific circumstances. The purpose of these processes is to reduce or eliminate the presence of contaminants in the finished product and to fulfil the requirements set in Chapter 6 of the Guidelines. Other processes or combination of processes may be used in order to fulfil these requirements. It is the responsibility of industry to demonstrate through Good manufacturing practice (see Technical Document No. 4) that the end-product meets the requirements of Art. 2 of Council Directive 89/109/EEC.

**TABLE 3 - CONSOLIDATED MATRIX
PART I**

The matrix should be read in conjunction with the rest of the Guidelines

Food type (Chapter 4)	Recovered paper group (Chapter 3)	Process technologies (Chapter 5) (other processes or combinations of processes may be used provided that the end-product fulfils the requirements of Chapter 6)	Additional end-product requirements (Chapter 6) (tests should be carried out for other toxic substances whenever there are grounds to suspect their presence in the end-product)
Food type I Aqueous and/or fatty foodstuffs (including defrosted)	Group 1: Paper and board manufactured with substances listed in Technical document No. 1	Mechanical cleaning	The requirements of Table 2 of the Guidelines do not apply
	Group 2: Paper and board manufactured with substances not listed in Technical document No. 1, unprinted or lightly printed or lightly coloured	Mechanical cleaning Washing Chemical treatment, unless it is not necessary Thermal treatment, unless it is not necessary	Michler's ketone, DEAB, DIPNs, HTPP, Phthalates, Solvents, Azo colourants, FWAs, Aromatic amines, Polycyclic aromatic hydrocarbons, Benzophenone

TABLE 3 - CONSOLIDATED MATRIX

PART II

The matrix should to be read in conjunction with the rest of the Guidelines

Food type (Chapter 4)	Recovered paper group (Chapter 3)	Process technologies (Chapter 5) (other processes or combinations of processes may be used provided that the end-product fulfils the requirements of Chapter 6)	Additional end product requirements (Chapter 6) (tests should be carried out for other toxic substances whenever there are rounds to suspect their presence in the end-product)
Food type II Dry, non-fatty foodstuffs, including frozen	Group 1: Paper and board manufactured with substances of the 'List of substances used in the manufacture of paper and board materials and articles intended to come into contact with foodstuffs' (Technical document No. 1)		The requirements of Table 2 of the Guidelines do not apply
	Group 2: Paper and Board which may be manufactured with substances not listed in Technical document No. 1, unprinted or lightly printed or lightly coloured	Mechanical cleaning Washing Thermal treatment, unless it is not necessary	DIPNs, HTTP, Phthalates, Solvents, Polycyclic aromatic hydrocarbons, Benzophenone
	Group 3: Printed paper and board, corrugated board from supermarkets and paper and board from households and industry	Mechanical cleaning Washing Chemical treatment, unless it is not necessary Thermal treatment, unless it is not necessary De-inking, unless it is not necessary	DIPNs, HTTP, Phthalates, Solvents, Polycyclic aromatic hydrocarbons, Benzophenone
Food type III Foodstuffs which are shelled, peeled or washed	Group 1: Paper and board manufactured with substances Listed in Technical document No. 1	Mechanical cleaning	The requirements of Table 2 of the Guidelines do not apply
	Group 2: Paper and Board which may be manufactured with substances not listed in Technical document No. 1, unprinted or lightly printed or lightly coloured	Mechanical cleaning	The requirements of Table 2 of the Guidelines do not apply
	Group 3: Printed paper and board, corrugated board from supermarkets and paper and board from households and industry	Mechanical cleaning Washing	The requirements of Table 2 of the Guidelines do not apply

Recovered paper process technologies

1.1. Repulping

This is always the first step. During pulping, fibres are separated and some additives added to the paper during the printing and converting process are separated from the fibres.

Various kinds of devices can be used : low, medium or high consistency pulpers and drums are proposed by machinery suppliers.

The choice of the type of pulper has to be made by considering various parameters including the efficiency of defiberizing and energy consumption but mainly with respect to:

- efficient ink detachment when de-inking is to be carried out. Chemicals (e.g. caustic soda, sodium silicate and soap) are used in the pulping stage in order to improve ink release from the fibres. Bleaching chemicals (such as hydrogen peroxide) can also be used in this stage;
- minimising the breaking-up of contraries, which could reduce their removal efficiency.

1.2. Removal of contraries

The removal of contraries is based on their physico-chemical properties, which differ from those of cellulosic fibres :

- differences in size : particles smaller than fibres can be removed by washing and contaminants larger than fibres can be removed by screening (Fig. 1 and 3);
- differences in density : particles having a density other than 1 can be removed by centrifugal cleaning. Some cleaners are designed to remove high density (>1); contaminants and others to remove lightweight contaminants (density < 1) (Fig 2);
- differences in surface properties : flotation can remove hydrophobic particles, additives (collectors) are generally used to improve the flotation efficiency (Fig 4).

In order to ensure good cleaning efficiency, size, shape and density must be considered; flotation efficiency mainly depends on surface properties.

Figure 1: Principle of screening

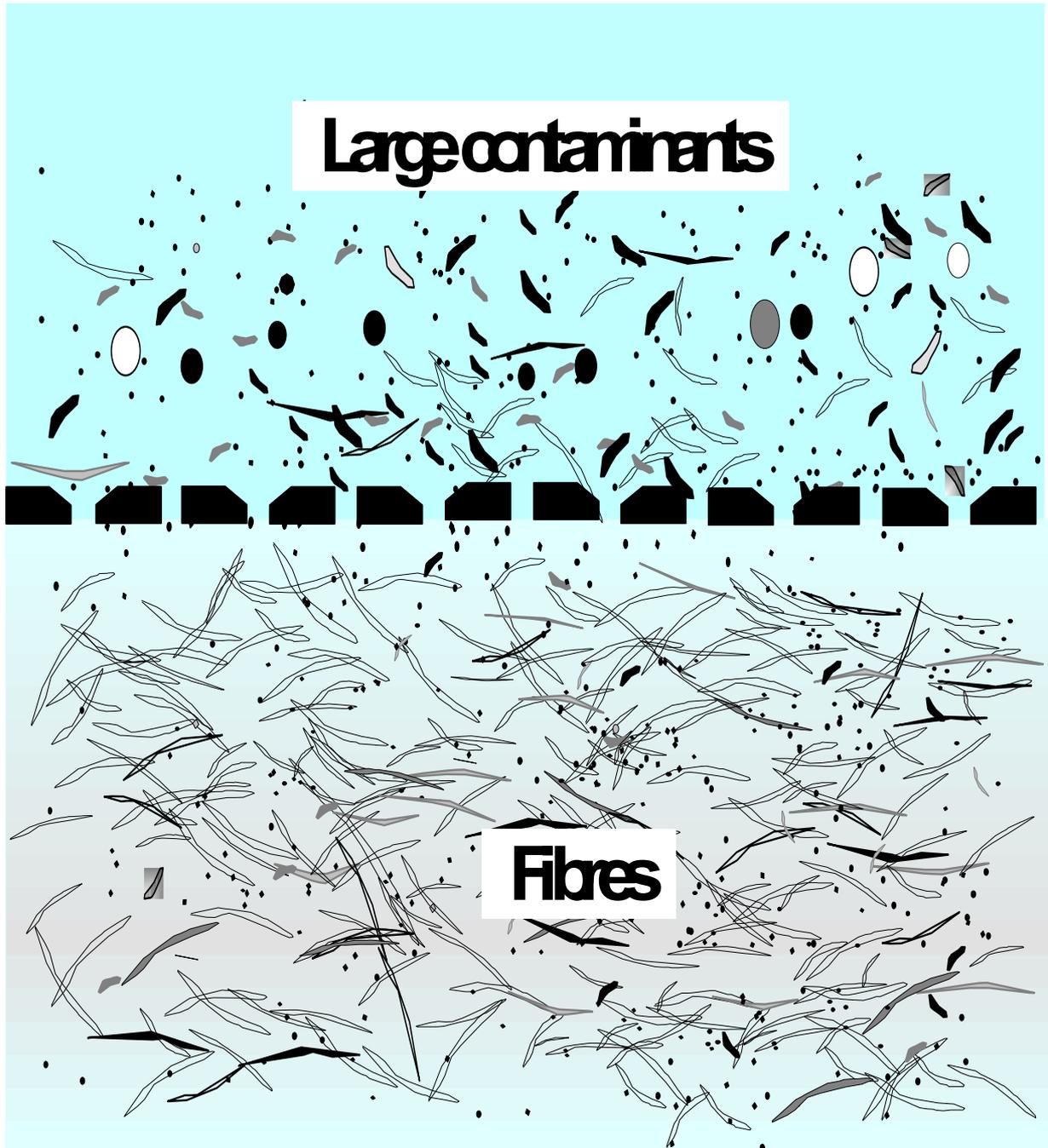
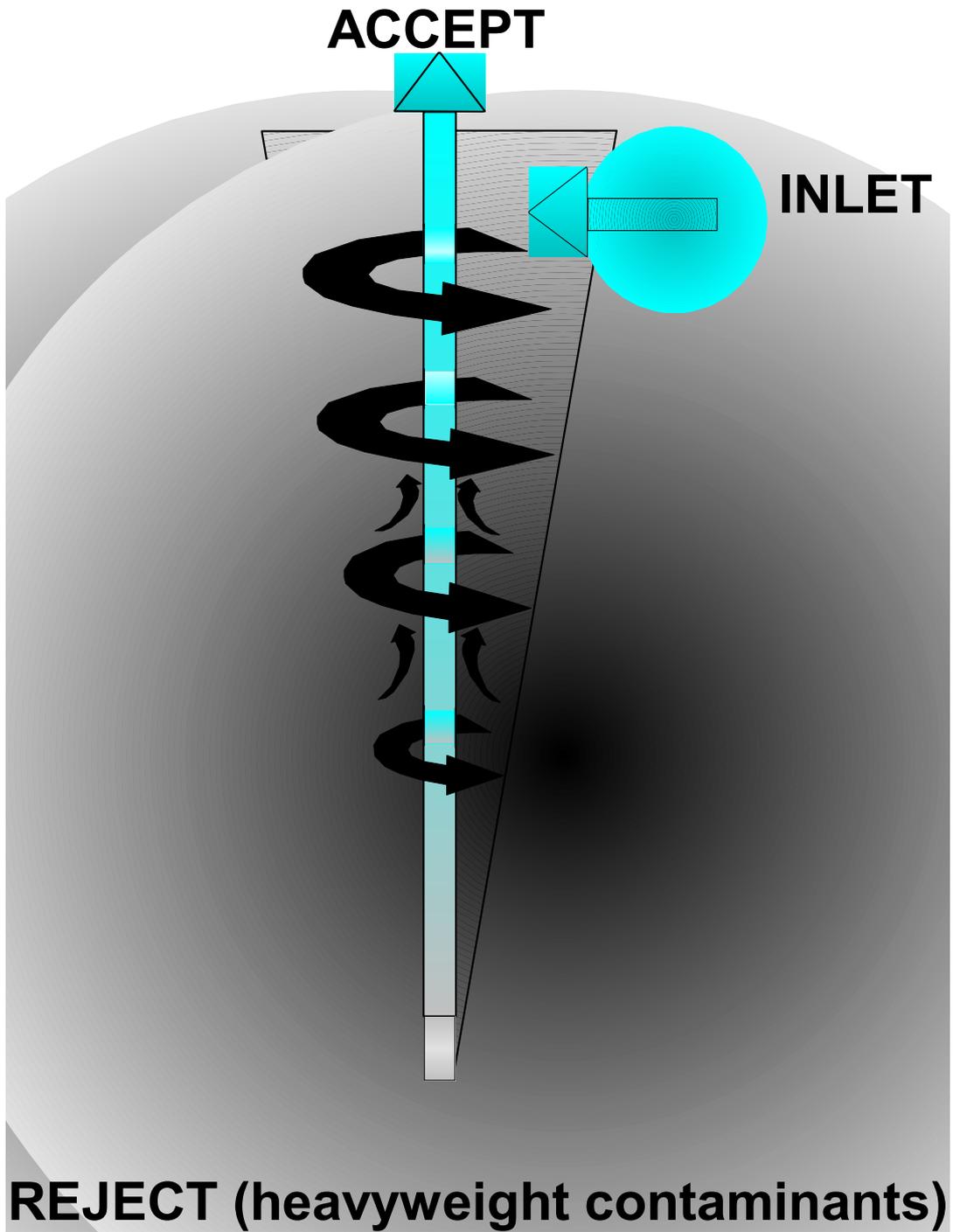
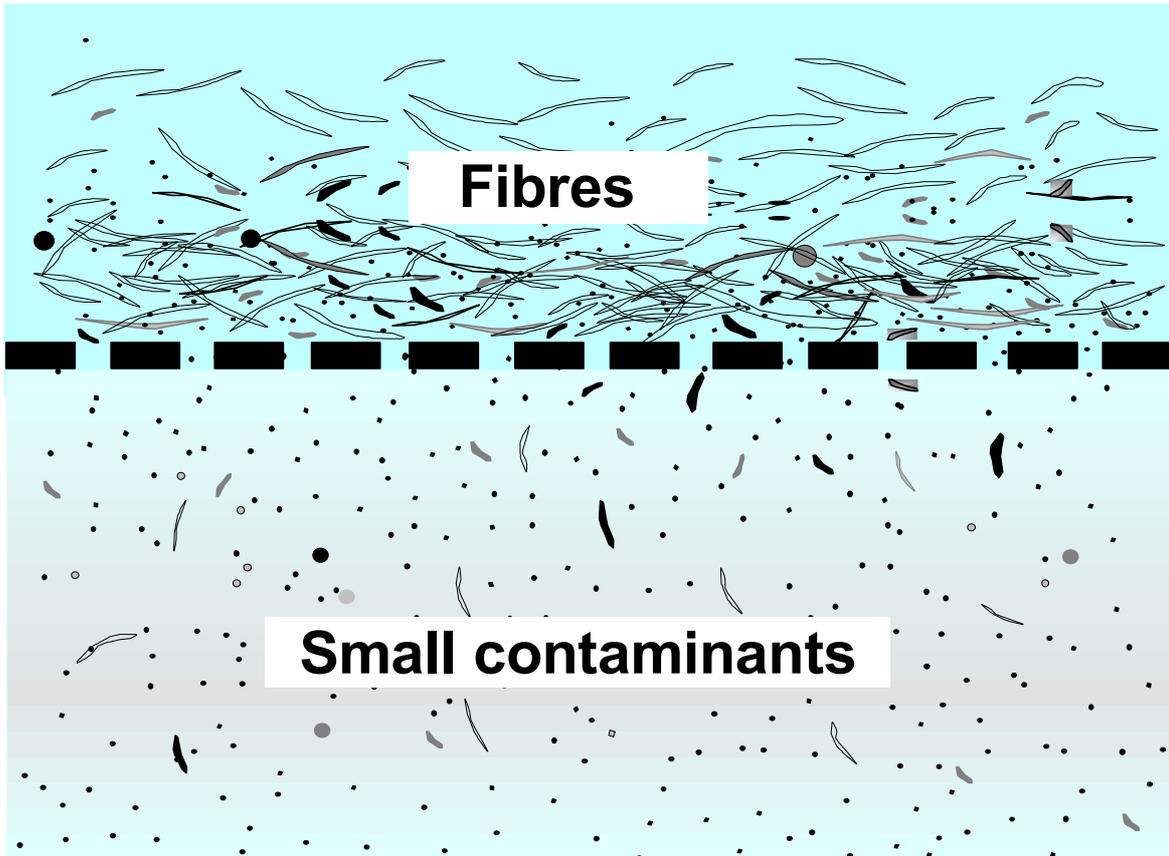


Figure 2: Principle of cleaning



Washing can remove fillers and finely divided ink particles, as well as colloidal materials dispersed in water. Very efficient cleaning is obtained. The drawback is the use of important volumes of water, which need a suitable treatment, and a significant loss of fibrous and non-fibrous material. The losses are removed as sludge by the water treatment.

Figure 3 : Principle of washing



Flotation can remove ink (oil-based ink with hydrophobic characteristics), varnishes and various adhesive particles. Flotation efficiency also depends on particle size, which has to be severely controlled at the pulping stage.

Cleaning (heavy contaminants) can remove metals, sand, glass, and some varnish particles. This technique is also used to remove toner ink after agglomeration with appropriate chemicals.

Cleaning (lightweight contaminants) can remove hot melt adhesives and various plastic particles.

Screening can remove large contaminants including plastic films, shives, wet strength papers. Hole screens are efficient with flat contraries, such as varnish particles ; they are followed by slot screens which remove granular particles. The slot width is usually 150 µm. Screens with 80 µm wide slots are currently being developed.

Process water treatments are implemented in order to remove fillers and inks from washing waters and, in some cases, colloids in thickening water. The most common technique involves microflotation. Additional treatments with biocides are used to control microbial growth in the circuits. This is also applicable to water on the paper machine.

1.3. De-inking by flotation

De-inking lines are made up of a combination of the various techniques. The number of stages in the process depends on the grade of the furnish and the quality requirement of the de-inked pulp to be produced.

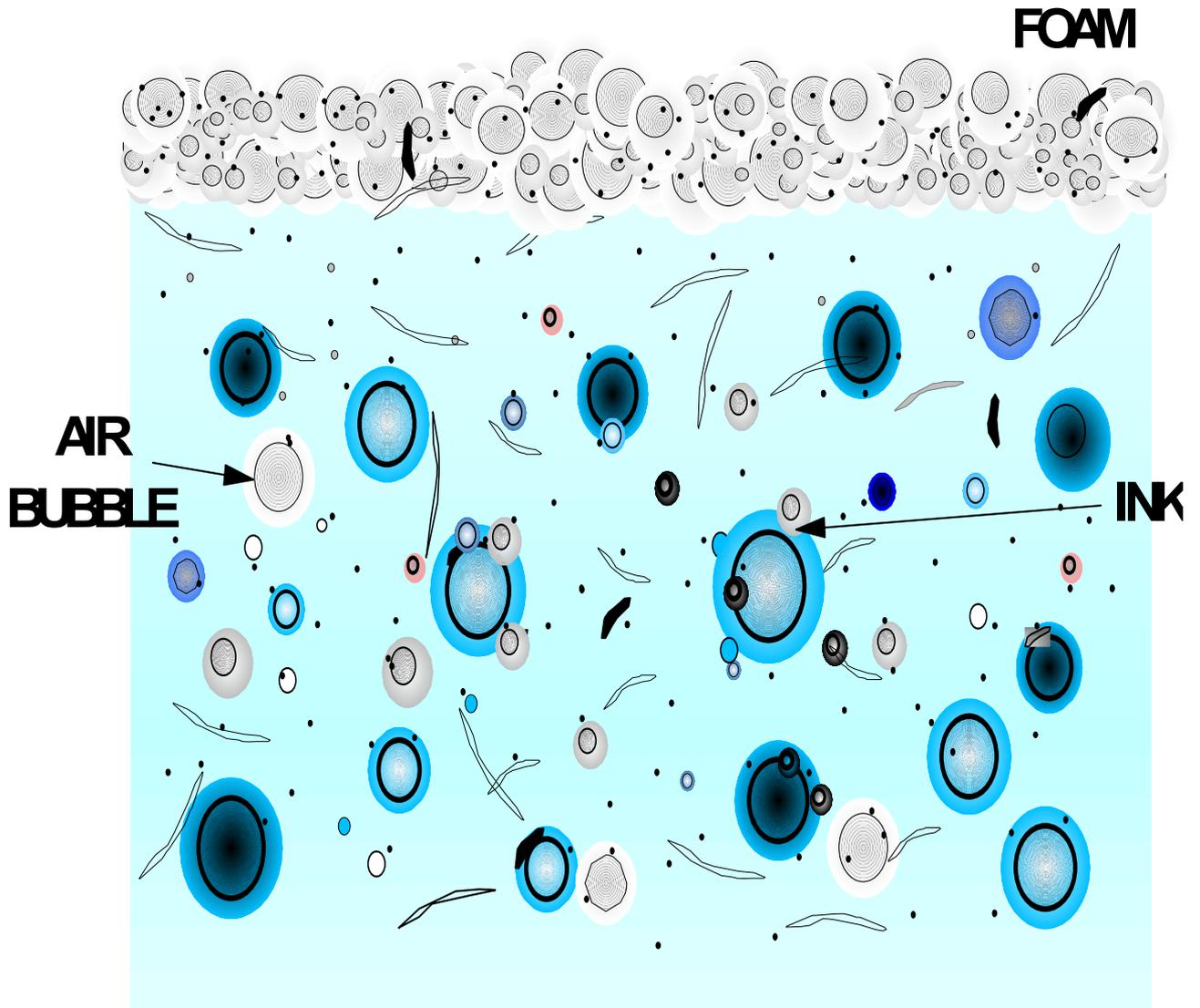
Recovered papers are defiberised in a medium consistency pulper or a drum pulper (15 to 18% consistency). After dilution, coarse screening removes large contraries such as plastic films and wet-strength papers. High density cleaning removes heavy contraries such as staples and sand.

Hole and slot screening are performed at medium consistency (up to 4 %). Then, the pulp is diluted down to between 1 and 1.4 % consistency and submitted to flotation. Cleaning stages (heavy and lightweight) take place after flotation, generally after a complementary dilution (down to 0.7 %). A fine slot screening stage is generally implemented after cleaning. Then the pulp is thickened on a disk filter. The white water is treated and re-used for dilution in the various stages of the process. After the filter, the pulp is stored or diluted with water from the paper machine.

After the thickening stage on the filter, a screw press is used to increase the consistency up to 30 %, and the pulp may be submitted for hot dispersing and peroxide bleaching.

Post-de-inking (a second de-inking stage, using the same techniques as in the first stage) performed after hot dispersing and bleaching is carried out in some mills, as an efficient way to improve brightness and cleanliness.

Figure 4: Principle of de-inking by flotation



1.4. Hot-dispersion

This technology, which is not concerned with contraries removal, can also be used in recovered fibres processing lines. Hot dispersing with low-speed kneaders or high-speed dispersers can be used to disperse residual contaminants such as hot-melt adhesives or specks from varnish particles and toner inks. Some contaminants such as adhesive particles from labels or tapes show little dispersion ability.

Hot dispersion is an efficient treatment for the detachment of residual ink particles in the case of processes involving two or more de-inking loops^[1].

1.5. Bleaching

So-called upgrading treatments can be applied to the pulp, whether de-inked or not. Brightness is often an important concern and bleaching treatments can be applied to the reprocessed pulp. Hydrogen peroxide (oxidative) bleaching and sodium hydrosulfite (or FAS) (reducing) bleaching are the most common treatments used for recovered paper bleaching^[2]. Bleaching restores the initial brightness of cellulosic fibres by destroying chromophores^[3]. This chemical action may also remove undesired chemical substances and micro-organisms. Bleaching is in certain cases aimed at colour stripping or destruction of optical brightening agents^[4]. Visual uniformity of the pulp (so-called cleanliness) is also an important quality. As described previously, this can be improved by hot dispersing.

1.6. Other upgrading treatments

1.6.1. Oxygen treatment

This treatment is carried out in a gaseous oxygen environment, at a high temperature and under pressure, with metal chelating agents.

1.6.2. Ozone treatment

Ozone is produced by circulating pure oxygen gas between electrodes at a high voltage. It is a highly reactive gas, which destroys chromophores and micro-organisms. Under certain conditions, colourants and fluorescent whitening agents may be removed^[5].

1.7. Clarification of recirculated water

Process waters are always re-used to a certain extent. The trend is towards more and more closed systems. The drawback is an increased concentration of unwanted substances: dissolved organic and inorganic substances (carbohydrates such as starch and hemicelluloses, salts, colloids etc.), suspended solids (fines, fibres, filler and ink particles etc). Increased values of chemical and biological oxygen demand (resp. COD and BOD), suspended solids and microbiological counts are recorded.

Dissolved air flotation systems are used for the removal of suspended solids. Their efficiency is poor towards colloids (adhesives or polymeric additives arising from recovered papers). A chemical destabilisation using strongly cationic polyelectrolytes will cause coagulation of the colloids, which then may be partially removed in the microflotation cells^[6].

1.8. Process water treatment

Microbial growth is controlled by selected biocides. The aim of so-called anti-slime treatments is to avoid the development of scale (aggregates of microbial colonies) or catalase, an enzyme which is produced by most aerobic micro-organisms for fighting peroxides and free radical metabolites.

The presence of catalase results in hydrogen peroxide decomposition and low brightness gain at the bleaching stage^[7]. An "absolute" microbiological cleanliness of process waters is unnecessary. A "critical control point" approach shows that most germs which are present in process waters are destroyed at further stages of the process.

References

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TECHNICAL DOCUMENT No. 4

**CEPI GUIDE
FOR GOOD MANUFACTURING PRACTICE
FOR PAPER AND BOARD FOR FOOD CONTACT
(prepared by CEPI)**

**Version 1
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CEPI GUIDE FOR GOOD MANUFACTURING PRACTICE FOR PAPER AND BOARD FOR FOOD CONTACT

SECTION I – SCOPE, GENERAL PRINCIPLES, ETC.

1. Scope and field of application

This Good Manufacturing Practice (GMP) is a technical document containing recommendations for the guidance of paper and board manufacturers. The recommendations apply to the entire production process of paper and board and cover all fibrous compositions, virgin and/or recycled fibres. It also applies to all other activities which normally take place at the paper or board mill including coating, calendering, slitting, sheeting and other mill-based finishing operations. It does not cover converting operations such as plastic coating, corrugating, lamination and so on. It applies to paper and board as defined by the resolution.

Existing product liability legislation should be considered in order to make sure that due responsibility is taken by paper and board manufacturers for all manufacturing factors as they apply to the product end use. It will be the care of paper and board manufacturers to provide users with appropriate product information.

It shall be the responsibility of the users of the paper and board to inform the manufacturers of intended end use.

The recommendations offer organisational and practical advice on the management of key factors affecting product quality and fitness for purpose, especially safety with respect to food contact. They cover all the production stages from the raw materials order (procurement) and supply to the point where the product is dispatched from the paper manufacturer.

A paper or paperboard material, which the customer has ordered, is thus manufactured according to an agreed quality standard which includes all requirements existing in relevant Directives or regulations or legislation which is applicable for food contact paper and board.

2. General aspects and principles

GMP is based on a quality management system, such as the ISO 9000 series of standards or another, equivalent, recognised scheme and on the relevant principles of a recognised hazard analysis system, such as HACCP (Hazard Analysis Critical Control Point, see Section II, below). These systems are related one to each other since they have the same principles.

For each stage of production, including the receipt of an order, the procurement of raw materials, the different steps of processing, manufacturing and testing, finishing and shipping of the product, a total control has to cover, for example:

- manuals;
- production instruction documents;
- specifications for testing;

handling, storage, packaging, preservation, product identification and delivery;
personal training and commitment, internal auditing;
production and quality records.

A high level of housekeeping, in terms of “appropriate level of cleanliness and order”, has to be maintained throughout the whole process.

3. Particular aspects

Among the principles of the GMP, the following have to be highlighted:

3.1. Management responsibility

The management has to make a strong commitment to the quality policy and assure that appropriate responsibility and authority is given, understood and applied at each level of the organisation

3.2. Personnel training

All personnel should be made aware of their duties and responsibilities concerning the requirements of the current legislation and of this code of GMP. Their training should be performed and assessed in a suitable manner. New employees will be made aware of food contact manufacturing requirements as part of their induction process. Records of assessments and training received will be maintained.

3.3. Quality system

A quality system has to be installed and maintained in order to assure product conformity to the specified requirements. Procedures have to be implemented to avoid misunderstanding when producing the order.

3.4. Raw materials (pulp and non-fibrous components)

A system has to be implemented to ensure that only raw materials in conformity with the needs of the end product are purchased. Non-fibrous constituents shall be selected according to Technical document No 1 ‘List of substances used in the manufacture of paper and board materials and articles intended to come into contact with foodstuffs’.

Pulps shall comply with the resolution and, where applicable, with the guidelines on recycled fibres.

Only “qualified suppliers” are traded with.

Qualification may be either:

- a) by certification to ISO 9000 (or another recognised system).
- b) by the confidence, consistency and reliability established with a supplier due to the existence of a long-term business relationship backed up by continuing quality assurance tests on the raw material.

All materials from a new supplier or of a new grade must be assessed for suitability for conversion to the final product. If the results are satisfactory, the material is accepted and can be ordered in the future against an agreed specification.

All incoming raw materials should be clearly identified and stored only in specially designated areas. Appropriate cleanliness and hygiene are to be maintained in the raw materials storage areas.

Control upon reception of raw materials is implemented taking into account also the extent of control carried out by the suppliers, and the fact that a registered proof of raw material compliance may be provided upon delivery.

3.5. Process control

The process has to be clearly defined and planned; it has to be demonstrated that the process runs continuously under controlled conditions. Great importance must be given to the control of the process parameters due to the complexity of paper and board technology, particularly to avoid and remove possible contamination in order to fulfil the end product requirements.

Each mill/producer has to identify and keep under control in its own process the critical control points related to the hazard analysis system (see below) and food contact requirements. The microbiological load within the mill should be monitored but testing should be performed only where indicated by the hazard analysis (see below).

3.6. Handling, storage, packaging preservation and delivery

These aspects of the products have to be maintained under control.

It is particularly important that items in stock are well identified and can only be dispatched for an end use that is permitted within the Directives, regulations, and legislation for food contact.

Appropriate cleanliness and hygiene are maintained in the storage areas.

A clear procedure needs to be developed to ensure dispatch of products that meet the agreed quality standards.

3.7. Traceability

An accurate system to enable tracking through the production process from raw materials through to final customer order has to be implemented.

3.8. Labelling

All finished products must be labelled so that production history, including details of raw materials, manufacturing dates, etc. may be traced.

3.9. Testing

Testing and inspection procedures have to be defined, to verify the compliance of the final product with the agreed quality standards and with the Resolution and Guidelines.

3.10. Quality records

The results have to be recorded and filed. Procedures for quality recording have to be defined in order to guarantee the correct identification, collection, filing, and distribution of the quality reports.

3.11. Testing methods

When available, standardised testing methods are preferred (e.g. CEN, ISO, etc.).

3.12. Calibration procedures

Inspection, measuring and test equipment must be regularly maintained and calibrated; records of these activities should be kept.

3.13. Auditing

Procedures should be defined to verify the correct performance of the quality system. These will vary according to the chosen quality scheme.

SECTION II - HAZARD ANALYSIS APPROACH

1. Inventory of hazards, suggested means of prevention

The manufacturing stages of reeled and sheeted articles intended to come into contact with foodstuff are listed, from raw materials to shipping.

The method implemented for the present Guide consists of listing the hazards related to each manufacturing stage using the principles contained in the HACCP method.

For each manufacturing stage, Tables 1 to 5 indicate which hazards may be encountered and the means of prevention.

Possible additional hazards related to specific processes, plants or products have to be inserted directly by each mill.

In Tables 1 to 5, hazards are defined in conformity with the definition given in the note below.

Note:

The HACCP method, as used in food manufacturing and processing, is described in the revised draft Guidelines indicated in Annex II of the document referenced ALINORM 97/13A *Revised draft Guidelines for the application of hazards, Analysis and Critical Control Point (HACCP) and system*, document which was elaborated by a commission from the international authority Codex Alimentarius. This document gives the following definition of the word "hazard": *A biological, chemical or physical agent in, or condition of, food with the potential to cause an adverse health effect*. The analysis of hazards through the HACCP method is a procedure consisting of collecting and estimating the information relative to the hazards and to the conditions leading to their presence, in order to identify which hazards and conditions are significant regarding food safety, so that they may be submitted to the HACCP plan mentioned in the standard.

2. Manufacturing stages for paper products

Raw materials

- selection prior to purchase
- transport (delivery to factory)
- reception
- storage
- handling

Fibre preparation process technologies

- de-flaking, de-inking, hot dispersion, etc.

Preparation and introduction of additives

Refining, cleaning, diluting, sheet formation
Drying
Surface treatments
Winding and finishing (calendering, cutting)
Control of finished product
Labelling
Storage of finished products
Shipping

TABLE 1

STAGES	POSSIBLE HAZARDS	SUGGESTED MEANS OF PREVENTION
<p>FIBROUS RAW MATERIALS a) Selection prior to purchase</p>	<p>Contamination from a chemical and/or microbiological source, due to the use of raw materials whose safety has not been determined.</p>	<p>Reference to Technical document No 1 'List of substances used in the manufacture of paper and board materials and articles intended to come into contact with foodstuffs'</p>
<p>b) Transport (delivery to factory)</p>	<p>Contamination from a chemical and/or microbiological source, linked with absence of cleanliness (truck, etc.).</p>	<p>Reference to the specifications of both carrier and supplier.</p>
<p>c) Reception, storage, handling</p>	<p>Contamination from a chemical and/or microbiological source at the moment of storage, as a consequence of mixing up grades suitable for food-contact with unsuitable ones.</p>	<p>Separate areas (where relevant), compliance with procedures (quality assurance).</p>

TABLE 2

STAGES	POSSIBLE HAZARDS	SUGGESTED MEANS OF PREVENTION
<p>NON-FIBROUS RAW MATERIALS a) Selection prior to purchase</p>	<p>Contamination from a chemical source, due to the use of raw materials whose safety has not been determined.</p>	<p>Reference to Annex II of the resolution</p>
<p>b) Transport (delivery to factory)</p>	<p>Contamination from a chemical and/or microbiological source, linked with absence of cleanliness (truck, tank, etc.).</p>	<p>Reference to the specifications of both carrier and supplier.</p>
<p>c) Reception, storage, handling</p>	<p>Labelling error leading to the introduction of incorrect material.</p>	<p>Indication upon order form about the product's technical reference. Definition of requirements upon ordering.</p>
	<p>Contamination from a microbiological source, linked with absence of cleanliness.</p>	<p>Appropriate premises. Maintenance of cleanliness of premises (appropriate cleaning, rodent control, etc.).</p>
	<p>Usage error and contamination from a chemical and/or microbiological source, linked with cross contamination in case of bulk storage.</p>	<p>Separate areas (where relevant), compliance with procedures (quality assurance), storage duration and conditions (observance of expiry dates for use).</p>

TABLE 3

STAGES	POSSIBLE HAZARDS	SUGGESTED MEANS OF PREVENTION
RE-PULPING AND OTHER PROCESS TECHNOLOGIES	Error about raw materials which may lead to the introduction of inadequate raw materials into the pulper.	Manufacturing specifications
	Contamination of the pulp from micro-organisms brought by pests.	Maintenance of cleanliness of premises (rodent control, etc.).
	Contamination from a chemical source, linked with production shift (from non-food to food products)	Manufacturing specifications, grade shift procedure.
PREPARATION AND INTRODUCTION OF ADDITIVES	Inadequacy of physical characteristics and/or possible contamination from a chemical source, linked with concentration error or overdose of hazardous products.	Procedures. Records.
	Contamination from micro-organisms as a consequence of microbiological growth of a preparation (e.g. amylaceous glues).	Compliance with procedures. Cleaning of preparation chests. Storage conditions (e.g. temperature). Preventive treatment with biocides.

TABLE 4

STAGES	POSSIBLE HAZARDS	SUGGESTED MEANS OF PREVENTION
REFINING, CLEANING, DILUTING, SHEET FORMATION	Contamination from a microbiological source, linked with absence of cleanliness (chests, circuits).	Cleaning procedures. Underwire water treatment
	Contamination from a chemical source, from cleaning agents of clothing.	Where cleaning agent is not on positive list, segregation of cleaning water from other parts of machine is needed
SURFACE TREATMENT	Inadequacy of physical characteristics and/or possible contamination from chemical components as a consequence of a quantity of deposit possibly out of regulatory tolerance, or out of specification.	Compliance with procedures.
	Contamination from micro-organisms, linked with microbiological growth of a preparation.	Compliance with procedures. Cleaning of preparation chests. Storage conditions (e.g. temperature). Preventive treatment with biocides
WINDING AND FINISHING (FOR REELS) PALETTISATION (FOR SHEETS)	Soiling due to condensation or to premises dust fallout onto the reel.	Appropriate maintenance of premises.
	Contamination from a chemical and/or microbiological source due to the lack of cleanliness of pallets or inappropriate treatment of the wood	
WRAPPING AND PACKAGING	Contamination (toxicological and /or organoleptic) from a chemical and/or microbiological source due to the lack of cleanliness or lack of integrity or from packaging materials.	Appropriate maintenance and cleanliness of premises. Selection of an appropriate packaging material.
PRODUCTION AREAS	Contamination from a chemical source, linked with leakage or residues from cleaning agents.	Restricted stored amount of hazardous cleaning products, or of their residues in production areas. Compliance with procedures.
	Contamination from a microbiological source linked with humidity, temperature, and absence of cleanliness of premises (undesirable animals and insects).	Cleaning and sanitation (UV insect control lamps and rodent control)

TABLE 5

STAGES	POSSIBLE HAZARDS	SUGGESTED MEANS OF PREVENTION
VERIFICATION OF FINISHED PRODUCTS	Inadequacy of physical characteristics and/or chemical characteristics possibly out of the regulatory tolerance.	Compliance with procedures, process control, down-grading and identification of products which are out of specification, records. Clear and precise identification of samples for laboratory analysis.
LABELLING	Error of identification of paper or batch mix-up leading to the use of a paper unsuitable to the required utilisation.	Compliance with procedures.
STORAGE OF FINISHED PRODUCTS	Degradation of the physical characteristics of paper due to bad storage conditions (humidity, temperature) or to excessive storage duration.	Implementation of appropriate conditioning. Compliance with procedures. Preventive maintenance programme. Maintenance of cleanliness of premises (appropriate cleaning, rodent control).
	Contamination from a biological source such as animals, insects or micro-organisms, linked with absence of cleanliness within storage areas.	Compliance with procedures. Maintenance of cleanliness of premises (appropriate cleaning, rodent control).
SHIPPING	Paper identification error, batch mix-up, bad condition of loading and of means of transport, leading to using a paper unsuitable for the required utilisation.	Implementation of specifications regarding transport. Compliance with procedures.
	Contamination from a microbiological source, linked with bad condition and absence of cleanliness of means of transport.	
	Contamination from a chemical source through polluting products from previous transport.	Implementation of specifications regarding transport. Requirement for non transportation of chemicals and odorous products in the vehicles used. Compliance with procedures.

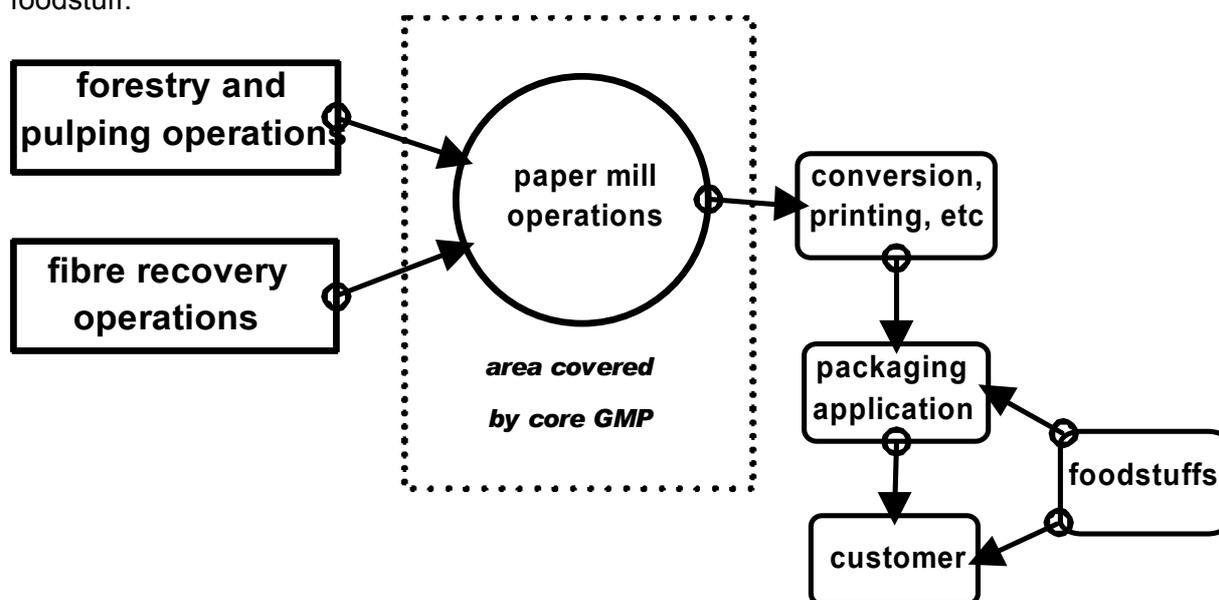
SECTION III - EXPLANATORY NOTE - THE PAPER-MAKING PROCESS AND GLOSSARY OF TERMS

1. Introduction

This note is designed to accompany the Good Manufacturing Practice written for paper and board for food contact. It contains a brief description and schematic diagram of the paper-making process (Figure 2) together with a glossary of terms (Table 6) used in the GMP.

2. The Manufacturing chain

The following diagram shows a simplified form of the manufacturing chain from forest to foodstuff.



This shows clearly that the Good Manufacturing Practice covers only a restricted portion of the manufacturing chain. For the purposes of this document, this is referred to as “paper mill operations” and is now described in more detail and illustrated in the schematic diagram shown later. It is important to note that certain paper products are converted within the paper mill and then sold direct to retail outlets. These will be subject to special extensions to the GMP.

3. Paper manufacture (terms in *italics* are found in the glossary)

3.1 Raw Materials

Paper and board is manufactured mainly from pulp which is derived from wood using a variety of mechanical and chemical processes and recovered paper. The mixture used depends upon end use and ranges from 100% *virgin pulp* through to pulp made from 100% *recovered paper*. There are speciality areas which also use synthetic fibres, cotton, etc. *Pulp* is supplied direct from forestry and *pulping* operations. It is delivered to the paper mill in a dry state in stand-alone mills or in a wet state in mills which are integrated with *pulp* manufacture. *Recovered paper* comes from merchants who use collection systems. It may be subject to those treatments designed for recovered papers before being passed to the paper machine. These could include: *special pulping*, *de-inking*, *bleaching*, *hot dispersion*, *washing*, *oxygen treatment*, *ozone treatment* and *enzymatic treatment*.

Whatever the source, the *pulp* is passed to a *re-pulping* unit where it is mixed with up to 100 times its weight of water and subjected to violent agitation intended to produce a suspension of individual fibres in water. At this, and subsequent stages, *auxiliary chemicals*, *additives* and *fillers* may be added. The *auxiliary chemicals* and *additives* are usually combined with the fibrous raw materials at levels below 1% - 2%. Typical materials include sizing agents to bond the sheet together, pH control agents, de-watering aids, etc. *Fillers* usually consist of clay, calcium carbonate or titanium dioxide and are added to modify the optical properties of the paper and board or as a fibre substitute.

3.2 Paper machine

The fibrous suspension or *stock* is pumped, via *storage chests*, various types of cleaning equipment and *refiners*, to the paper machine. Here, yet further water is added to produce a fibre suspension of as little as 1 to 10 parts fibre to 1000 parts water and the resulting mixture is passed into a *head-box* which squirts it through a thin slit across the full machine width (typically 2 - 6 m) on to a moving woven *wire* mesh. The water is then removed by a mixture of gravity and suction in a process known as *sheet formation* where the cellulose fibres start to consolidate into a thin mat which is almost recognisable as paper.

This *web* is then lifted from the wire mesh and squeezed between a series of *presses* where its water content is lowered to nearly 50%. It then passes around a series of cast-iron cylinders, heated to temperatures in excess of 130°C, where drying and microbiological decontamination takes place. It is then wound into a full machine width reel at a water content of 5% to 8%. Some papers may also undergo *surface treatments* e.g. sizing, grease-proofing, etc. before the reeling process. Throughout its passage from the *wire* mesh to the reeling operation, the paper *web* is supported on various types of *machine clothing* moving at the same speed.

Samples of paper removed from each machine reel are the subject of quality control testing and verification against the required specifications as part of the *quality system*.

3.3 Finishing, storage and despatch

Full machine width reels are passed into a separate area where they are subjected to further operations. These may be either simple operations where the reel is *slit* into a number of more narrow reels or cut into sheets. In some cases, intermediate processes may be performed such as wrapping, *coating* or *calendering*.

The products of the above operations are labelled and placed in a despatch area to await transport. Again, samples may be taken for quality control purposes and the results of earlier tests will be checked against the inventory to ensure that only approved material goes forward.

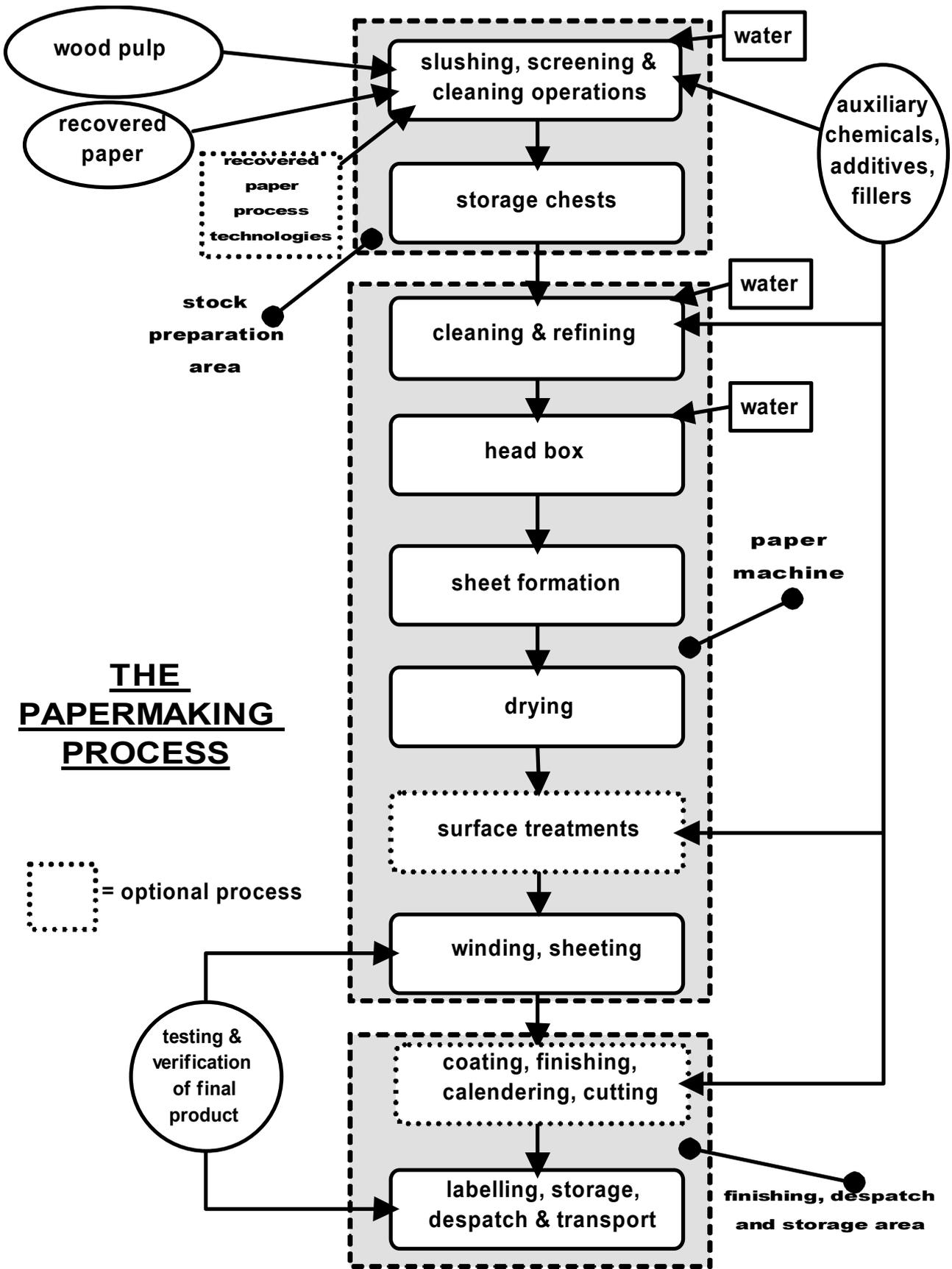


Figure 2

4. Glossary of terms

Additive	Substance added to the paper-making process to provide specific properties of the final paper and board.
Auxiliary chemical	A chemical added to a stage of paper-making aimed at improving the efficiency of a part of the process.
Bleached pulp	Pulp which has been subjected to bleaching.
Bleaching	Removal or modification to a greater or lesser extent, of wood resins and coloured components of pulp to improve purity and brightness.
Calendering	Operation carried out on the partially dried paper or board with the aim of improving the surface finish and printability.
Chemical pulp	Cellulose fibres obtained by dissolving and removing the non cellulose components in wood.
Cleaning	A mechanical or hydrodynamic operation to remove unwanted material from the pulp. Equipment is typically rotating screens or centrifugal cyclones.
Coating	The process of applying to the surface of a paper or board one or more layers of a liquid suspension containing pigments and binders to form a superior printing surface on the finished product. The materials used may include: pigments (clay, talc, calcium carbonate, etc.), binders (starch, latex, casein, etc.) and auxiliary substances (dispersing agents, insolubilizing agents, water retention agents, etc.). Coating is performed either on the paper machine or as a separate operation which then involves further drying.
Cutting	Dividing one, or simultaneously more than one, <i>web</i> of paper or board in the cross direction to produce sheets.
De-inking	Any process enabling the removal of inks from the fibres. The two most common types are screening and flotation.
Disintegration	The process of converting dry <i>pulp</i> into <i>stock</i> .
Drying	The process of reducing the water content of paper and board after it has left the <i>press</i> section of the paper machine.
Enzymatic treatment*	Application of biotechnology to the treatment of recycled pulp (improvement of characteristics, <i>de-inking</i> , etc.).
Finishing	All the operations performed at the mill after the paper machine to prepare the product for shipment (e.g. separate <i>coating</i> , <i>cutting</i> , <i>winding</i> , wrapping, labelling etc.).
Head box	A vessel, the full width of the paper machine, which ejects stock through a thin slit on to the moving <i>wire</i> mesh.

Hot dispersion*	Pulp treatment operated under pressure using steam at a temperature close to or more than 100°C in order to remove contaminants from the fibres. Normally, an intense, mechanical disintegration stage is used.
Machine clothing	A set of plastic wires and textile felts conveying and carrying paper through the paper machine
Mechanical pulp	Paper-making fibres separated by mechanical means mainly from wood.
Oxygen treatment *	Treatment of the <i>stock</i> made by gaseous oxygen at high temperature and under pressure.
Ozone treatment *	Treatment of the <i>stock</i> made by ozone or oxygen/ozone mix.
Paper machine	The machine that produces paper or board. There are different types of paper-machine depending on the <i>web</i> forming technology (e.g. four drinier, cylinder, twin wire, single ply, multi-ply, etc.).
Press	Two rolls, pressed tightly together, through which the moving <i>web</i> passes and which removes water by suction and transfer to a moving textile blanket.
Pulp	Material, generally of natural vegetable origin, made ready for use in paper-making processes by conversion to a mass of individual fibres.
Pulping	Process to convert wood (and other fibrous raw materials) to paper-making fibres.
Quality System	The organisational structure, the procedures, the processes and the resources that are needed to handle the Quality Management System).
Recovered paper	Paper collected by paper printing and other converting plants and from other parts of the waste stream which is returned into the paper-making process by collection and sorting.
Refiner/refining	A machine through which paper-making <i>stock</i> is pumped before delivery to the <i>head-box</i> . The machine imparts heavy mechanical action to the fibres which modifies their properties in different ways according to the final properties required.
Re-pulping	A process to disintegrate, in water, dry <i>pulp</i> or paper for further processing.
Semi-chemical pulp	<i>Pulp</i> obtained by partial removal from the raw material of those non-cellulosic components that can be removed by chemical treatment, for example cooking
Sheet formation	See <i>web formation</i> .
Sheeting	See <i>cutting</i> .
Slitting	Dividing a <i>web</i> of paper or board in the longitudinal direction into two or more narrower webs.
Special pulping*	Pulping with a chemical product (soda, peroxide, etc.).

Stock	An aqueous suspension of paper-making <i>pulp</i> .
Stock preparation	Process steps for conversion of <i>pulp</i> to stock. Can consist of <i>disintegration</i> , adding water, <i>fillers</i> and <i>auxiliary chemicals</i> , diluting, mixing and mechanically treat the paper-making components.
Storage chest	A large vessel for storing <i>stock</i> awaiting processing into paper and board.
Surface treatment	Treatment consisting of the application of an appropriate material or additive to the surface of a paper or a board to change certain characteristics e.g. printability, porosity, grease-proofness, etc.
Thermo-mechanical pulp	Paper-making <i>pulp</i> made by mechanical means in combination with heating, from various raw materials, but usually wood.
Unbleached pulp	<i>Pulp</i> that has not been subjected to <i>bleaching</i> .
Virgin pulp	<i>Pulp</i> supplied to a paper mill which contains fibres not used before in the paper-making process.
Washing*	Treatment operated on a <i>pulp</i> which is alternately thickened and diluted and passed through a series of filters with counter-current flow; the operation is carried out to clean the <i>pulp</i> .
Web	The continuous length of paper or board during manufacture or conversion.
Web formation	In the paper machine, the initial process of forming the <i>web</i> by physical de-watering of the <i>stock</i> .
Winding	Operation of rolling-up a <i>web</i> of paper or board.
Wire	A closely woven wire mesh, normally made of synthetic fibre, on to which the paper <i>stock</i> is directed and which then allows the passage of water away from the moving paper <i>web</i> .

** denotes a process technology that can be applied during various parts of the pulping and paper-making process but, in this context, only applies to the treatment of recovered paper and board*

