

Report of the Scientific Committee of the Spanish Agency for Food Safety and Nutrition (AESAN) on the Guide of the National Association of Board Manufacturers (ANFTA) to verify the suitability of MDF boards intended for the manufacture of containers for fresh fruits and vegetables that are not peeled or cut

Reference number: AESAN-2022-003

Report approved by the Scientific Committee in its plenary session on 5 April 2022

Working group

Pau Talens Oliag* (Coordinator), **Carlos Manuel Franco Abuín**, **Isabel Hernando Hernández**, **Ricardo López Rodríguez** (AESAN) and **Juana Bustos García de Castro** (AESAN)

Scientific Committee

Carlos Alonso Calleja Universidad de León	Carlos M. Franco Abuín Universidade de Santiago de Compostela	Sonia Marín Sillué Universitat de Lleida	Magdalena Rafecas Martínez Universitat de Barcelona
Houda Berrada Ramdani Universitat de València	Ángel Gil Izquierdo Consejo Superior de Investigaciones Científicas	Francisco J. Morales Navas Consejo Superior de Investigaciones Científicas	María del Carmen Recio Iglesias Universitat de València
Irene Bretón Lesmes Hospital Gregorio Marañón de Madrid	María José González Muñoz Universidad de Alcalá de Henares	Victoria Moreno Arribas Consejo Superior de Investigaciones Científicas	Ana María Rivas Velasco Universidad de Granada
Araceli Díaz Perales Universidad Politécnica de Madrid	Isabel Hernando Hernando Universitat Politècnica de València	Silvia Pichardo Sánchez Universidad de Sevilla	Gloria Sánchez Moragas Consejo Superior de Investigaciones Científicas
Pablo Fernández Escámez Universidad Politécnica de Cartagena	Esther López García Universidad Autónoma de Madrid	María del Puy Portillo Baquedano Universidad del País Vasco	Antonio Valero Díaz Universidad de Córdoba
Technical Secretary Vicente Calderón Pascual	*External contributor: Pau Talens Oliag (Universitat Politècnica de València)		

Technical management of the report AESAN: Ricardo Lopez Rodriguez

Abstract

The Scientific Committee of AESAN (Spanish Agency for Food Safety and Nutrition) had previously evaluated the suitability of the methodology proposed by the National Association of Board Manufacturers (ANFTA) to verify compliance of MDF boards intended for the manufacture of containers for fresh or refrigerated fruits and vegetables that are not peeled or cut with Article 3 of Regulation (EC) No. 1935/2004 on materials and articles intended to come into contact with food.

The Committee recommended the drawing-up of a sector-based Guide that would outline a detailed protocol to be followed in order to demonstrate that these requirements are fulfilled in the process of manufacturing articles obtained from MDF boards intended for the manufacture of containers for fresh or refrigerated fruits and vegetables that are not peeled or cut.

The final conclusion of the Scientific Committee is that the Guide submitted for its assessment is acceptable, at the present time, for the intended purpose.

It is recommended that the types of wood to be used be defined by their botanical names, reflecting their origin and the percentages of the different woods used in each case. Any other species would require a prior study with regard to its safety and compliance with Article 3 of Regulation (EU) No. 1935/2004, in particular aimed at ensuring the absence of migration of natural substances that may pose a risk to the consumer's health.

Although the sustainable origin of wood is not a requirement of the Guide, it is considered a highly recommendable criterion.

The Guide should be regularly updated in the light of experience with its application, progress in scientific knowledge and changes in legislation and guidelines that may be established at a national or European Union level.

Key words

MDF, migration, fruits, vegetables, materials, food contact.

Suggested citation

AESAN Scientific Committee. (Working group) Talens, P., Franco, C., Hernando, I., López, R. and Bustos, J. Informe del Comité Científico de la Agencia Española de Seguridad Alimentaria y Nutrición (AESAN) sobre la Guía de la Asociación Nacional de Fabricantes de Tableros (ANFTA) para verificar la aptitud de los tableros MDF destinados a la fabricación de envases para frutas y hortalizas frescas, sin pelar ni cortar. *Revista del Comité Científico de la AESAN*, 2022, 35, pp: 151-160.

1. Introduction

Medium Density Fibreboard (MDF) is a material composed of wood, adhesive, and water used in packaging fresh or refrigerated fruits and vegetables that are not peeled or cut.

In order to protect consumer health, Article 3 of Regulation (EC) No. 1935/2004 on materials and articles intended to come into contact with food (EU, 2004) provides that these elements shall be manufactured in accordance with Good Manufacturing Practices so that, under normal or foreseeable conditions of use, they do not transfer their constituents to foods in quantities that may endanger human health, unacceptably modify the composition of the food, or cause alterations in their organoleptic characteristics.

The Scientific Committee (AESAN, 2021) assessed the suitability of the National Association of Board Manufacturers (ANFTA) proposed methodology to verify MDF boards compliance with Article 3 of Regulation (EC) No. 1935/2004 on materials and articles intended to come into contact with food (EU, 2004).

In its report, the Scientific Committee pointed out that it is necessary to mention the specific woods that are used in each case, the place of logging, and any other data that may be relevant for assessing the safety of the boards, even when dealing with the by-products of plywood manufacturing or sawmill residue.

Specifications should be laid down covering, among others, the different types of wood that may be used, mixing percentages of different woods and sustainable exploitation certification requirements or other quality criteria. The wood type (species), along with their origin, are crucial factors in ensuring the safety of the final product, since although there is a common chemical composition in all woods, there are variations in the composition according to the species, inherent to the natural nature of the material (unlike synthetic materials made under controlled production conditions). On the other hand, their composition may be affected by environmental conditions, which may involve the presence of contaminants in the raw material.

Regarding the adhesive, its complete composition must be specified, must be in line with certain specifications of composition and quality, and must always comply with Royal Decree 847/2011 (BOE, 2011). It must be ensured that the addition of formaldehyde to the finished product does not invalidate it for food use.

In relation to water content, although MDF boards are manufactured with a water percentage of 5 to 10 %, their content may increase depending on the relative humidity of storage of the boards, such as cooling chambers, which may have high relative humidity. Therefore, tests and analyses must be carried out considering representative conditions of use.

Although the documentation provided by the applicant did not mention the use of inks or other elements such as paper or plastic coatings or staples on MDF boards, if used, their migration to food and their safety should be assessed.

It reiterated the importance for manufacturers to establish specifications for raw materials used and MDF boards produced and to ensure compliance concerning wood species, material composition, dimensions and mechanical properties, as well as food safety. This control must be performed whenever there are changes in the supply of raw materials or the production process that may entail

changes in the composition or characteristics of the boards.

To ensure food safety of MDF-based articles for use in contact with fruits and vegetables that are not peeled or cut, the applicant had proposed screening of potential volatile migrant substances by means of gas chromatography combined with mass spectrometry, material content tests, specific migration tests and other determinations related to organoleptic impact, antibacterial activity or presence of mineral oils.

The Scientific Committee considered that the proposed analytical strategy for the identification of potential migratory compounds and the conduct of specific migration tests was appropriate and a good starting point for assessing compliance with the requirements of Article 3 of Regulation (EC) No. 1935/2004 of MDF boards as single-use containers for fresh or refrigerated fruits and vegetables that are not peeled or cut (EU, 2004).

However, the Scientific Committee considered that the selection of substances detected in the raw material at the screening stage for migration control should not be limited exclusively to substances with an organoleptic impact and those with legal or recommended restrictions within international documents for other food contact materials. The risk assessment must consider all detected substances that potentially migrate to the food in contact.

It was recommended the drawing up of a sector-specific Guide that outlined a detailed protocol to be followed to demonstrate compliance with these requirements in the manufacturing process of articles obtained from MDF boards for food contact, including the considerations mentioned above concerning the specifications of raw materials and safety of the final article.

In any case, the use of MDF boards as food contact material should be limited to single-use, without subsequent re-utilisation for the same purpose by both industry and consumers.

In order to comply with these recommendations, the National Association of Board Manufacturers (ANFTA) has prepared a Guide on the suitability of the MDF board in the manufacture of fruit and vegetable containers (fresh fruits and vegetables that are not peeled or cut) (ANFTA, 2022) that AESAN (Spanish Agency for Food Safety and Nutrition) has submitted to its Scientific Committee for consideration.

2. Guidance for the verification of the suitability of MDF board for use in the manufacture of packaging for fresh or refrigerated fruits and vegetables that are not peeled or cut

The Guide for the verification of the suitability of the MDF board intended for the manufacture of containers for fresh or refrigerated fruits and vegetables that are not peeled or cut is structured in the following sections: Introduction, Objectives, Legislation, Regulations and other Documents, Process and Quality control, Quality Criteria and Declaration of Conformity.

In addition, an Annex concerning the declaration of conformity of the verification performed on each product is included.

The Guide:

- Defines the specifications and requirements to be met by both MDF boards for food use and the raw materials: wood and adhesive used for their manufacture.

- Lays down the analytical strategy for identifying potential migrant compounds and performing content and specific migration tests in order to assess compliance with the requirements specified in Article 3 of Regulation (EC) No. 1935/2004 of MDF boards for fresh or refrigerated fruits and vegetables that are not peeled or cut (EU, 2004).
- Establishes the frequency of checks required to ensure compliance with the requirements laid down in Article 3 of Regulation (EC) No. 1935/2004.

2.1 Specifications

The specifications for MDF boards follow those indicated in the document submitted by ANFTA for evaluation by the AESAN Scientific Committee in 2021 (AESAN, 2021), although some changes have been introduced.

These changes concern the removal of pentachlorophenol since it is no longer included in the update of the Council of Europe document on which the specification was based (Council of Europe, 2021). One of the two formaldehyde emission specifications also disappears because the UNE-EN ISO 12460-3:2021 standard (UNE, 2021), that replaces the UNE-EN ISO 12460-5:2016 standard (UNE, 2016), establishes it for coated boards, not being the boards object of the Guide.

In accordance with the latest amendment to Regulation (EU) No. 10/2011, a specification for chromium has been added in the case where chromium (VI) does not exist, and the specifications for arsenic, mercury and lead have been modified in line with that amendment (EU, 2020). The expression of the specifications has been changed from < to ≤ to be in line with the reference documents.

The average density specification has also been modified, making its variability more restrictive as laid down in the UNE EN 622-5 standard (UNE, 2010).

The requirements to be met by raw materials for manufacturing MDF boards for food contact are established.

With regard to wood, the following is stated:

1. For the manufacture of MDF for food use, only virgin wood can be used and recycled wood is not acceptable.
2. None of the 14 potentially toxic wood species listed in the scientific opinion of EFSA (European Food Safety Authority) issued in 2019 (EFSA, 2019) is acceptable.
3. Only conifer, eucalyptus and poplar wood should be used. Any other species would require a prior study on its safety.
4. Wood that has been treated with biocides is not acceptable.

With regard to the adhesive, it is stated:

1. MDF adhesive for food use must comply with Royal Decree 847/2011 (positive list of substances permitted for the manufacture of plastic materials intended to come into contact with food) (BOE, 2011). It must allow the requirements established for the MDF board in the specifications to be met.

The Scientific Committee considers that the modifications made to the specifications are acceptable as they respond to changes in the reference documents used for their establishment.

The Committee has suggested changes in structure or wording that have been included in the Guide.

2.2 Analytical strategy

Two analytical strategies are proposed.

2.2.1 Analytical strategy based on parameter content determination, screening and specific migration

In a first stage, the content of the selected analytes in the MDF material itself is determined.

Once the content is known, an estimate of the maximum possible migration would be made, assuming that the substance present migrates entirely and only on the face in contact with the food. To do so, the conventional ratio of 6 dm² of contact surface per kg of food is applied to determine the level of migration by mathematical calculations. No experimental migration tests shall be required if this estimated value does not exceed the specific migration limit.

If the limit is exceeded, the second stage of migration tests in an appropriate simulant would be carried out to experimentally determine the migration value, which would be compared to the migration limit after applying a reduction factor of 1/10 (factor applicable to fresh or refrigerated fruit and vegetables that have not been peeled or cut in accordance with Regulation (EU) 2016/1416 (EU, 2016)).

2.2.2 Analytical strategy based on the specific migration test

Taking as a reference Regulation (EU) No. 10/2011 on plastic materials and articles intended to come into contact with food, the specific migration of the respective analyte can be directly determined (EU, 2011).

Whenever the determination of specific migration is performed (in either of the two strategies included in the Guide), the simulant must be kept in contact with the MDF board surface according to the conditions of intended use.

These conditions are as follows: temperature: 40 °C, duration: 10 days, simulant: E (Tenax), relative humidity: 90 % simulated using accessible technology (or climate chamber).

2.3 Frequency of checks

It is proposed to perform compliance check tests of part of the specifications (so-called necessary tests, which include the determination of formaldehyde, melamine, metals and aromatic hydrocarbons from mineral oils), annually or when:

- Significant changes occur in the manufacturing process of MDF material.
- Significant changes occur in the raw materials used by the current supplier.
- Changes occur in the standards to which the conformity of the product is expressed.

The remaining tests concerning the specifications (so-called recommended tests): determination of

bisphenol A, primary aromatic amines, and organoleptic impact test, will be carried out when agreed between the manufacturer and the user of the MDF material for food use.

2.4 Declaration of Conformity

It is established that all the data of the verification carried out for each marketed product will be collected in the Declaration of Conformity that will reflect:

- Identification and address of the company that makes the Declaration of Conformity.
- Date of declaration.
- Identification and address of the manufacturer.
- Identification of the product.
- Confirmation that the manufactured board complies with the specifications defined in the Guide and with Regulation (EC) No. 1935/2004.
- Confirmation that the requirements for raw materials (wood and adhesive) laid out in the Guide are met.
- Confirmation that the necessary so-called tests relating to compliance with specifications have been performed.
- Specifications on the intended use of the material: manufacture of fruit and vegetable containers (Any other intended use is outside the scope of this declaration).
- List of certifications available to the manufacturer (ISO, FSC, PEFC, etc.).
- Confirmation that none of the potentially toxic wood species listed in the Guide is used.
- Confirmation that no wood treated with biocides has been used.

Unless one of the following situations occurs, the renewal of the Declaration of Conformity shall be annual.

A new Declaration of Conformity must be made in the following cases:

- If there are significant changes in the manufacturing process of the MDF material.
- If there are significant changes in the raw materials used by the current supplier.
- If there are changes in the standards for which the conformity of the product is expressed.

Conclusions of the Scientific Committee

In order to protect consumer health, Article 3 of Regulation (EC) No. 1935/2004 on materials and articles intended to come into contact with food (EU, 2004) provides that these materials and articles shall be manufactured in accordance with Good Manufacturing Practices so that, under normal or foreseeable conditions of use, they do not transfer their constituents to foods in quantities that may endanger human health, unacceptably modify the composition of the food, or cause alterations in their organoleptic characteristics.

The Guide for the verification of the suitability of the MDF board intended for the manufacture of containers for fresh or refrigerated fruits and vegetables that are not peeled or cut shows a procedure for assessing compliance with the requirements of Article 3 of Regulation (EC) No. 1935/2004

of MDF boards as single-use containers for fresh or refrigerated fruits and vegetables that are not peeled or cut.

The Scientific Committee concludes that the Guide for the verification of the suitability of the MDF board intended for the manufacture of containers for fresh or refrigerated fruits and vegetables that are not peeled or cut is acceptable, at the present time, for the intended purpose.

It is recommended that the types of wood suitable for use be defined by their botanical names, reflecting their origin and the percentages of the different woods used in each case. Any other species would require a prior study regarding its safety and conformity with Article 3 of Regulation (EC) No. 1935/2004, in particular to ensure the absence of migration of natural substances that may pose a risk to consumer health.

Although the sustainable origin of wood is not a requirement of the Guide, it is considered a highly desirable criterion.

The Guide should be updated regularly, considering the experience of its application, the progress in scientific knowledge, and changes in legislation and guidelines that may be established at the national or European Union level.

References

- AESAN (2021). Comité Científico AESAN. (Grupo de Trabajo). Talens, P., Franco, C., Ruiz, M.J., Rodríguez, D., López, R. and Bustos, J. Informe del Comité Científico de la Agencia Española de Seguridad Alimentaria y Nutrición (AESAN) sobre el riesgo asociado al uso de tableros de fibras de madera de densidad media (MDF) como material en contacto con frutas y hortalizas frescas o refrigeradas, sin pelar ni cortar. *Revista del Comité Científico de la AESAN*, 2021, 33, pp: 211-242.
- ANFTA (2022). Guía de la Asociación Nacional de Fabricantes de Tableros (ANFTA) para verificar la aptitud del tablero MDF destinado a la fabricación de envases para frutas y hortalizas frescas o refrigeradas sin pelar ni cortar.
- BOE (2011). Real Decreto 847/2011, de 17 de junio, por el que se establece la lista positiva de sustancias permitidas para la fabricación de materiales poliméricos destinados a entrar en contacto con los alimentos. BOE No. 164 de 11 de julio de 2011, pp: 76316-76330.
- Council of Europe (2021). Paper and board used in food contact materials and articles. European Committee for Food Contact Materials and Articles European Directorate for the Quality of Medicines & HealthCare of the Council of Europe (EDQM). pp: 1-50.
- EFSA (2019). European Food Safety Authority. Scientific Opinion on the update of the risk assessment of 'wood flour and fibres, untreated' (FCM No 96) for use in food contact materials, and criteria for future applications of materials from plant origin as additives for plastic food contact materials. *EFSA Journal*, 17 (11): 5902, pp: 1-14.
- EU (2004). Regulation (EC) No. 1935/2004 of the European Parliament and of the Council of 27 October 2004 on materials and articles intended to come into contact with food and repealing Directives 80/590/EEC and 89/109/EEC. OJ L 338 of 13 November 2004, pp: 4-17.
- EU (2011). Commission Regulation (EU) No. 10/2011 of 14 January 2011 on plastic materials and articles intended to come into contact with food Text with EEA relevance. OJ L 12 of 15 January 2011, pp: 1-81.
- EU (2016). Commission Regulation (EU) 2016/1416 of 24 August 2016 amending and correcting Regulation (EU) No. 10/2011 on plastic materials and articles intended to come into contact with food. OJ L 230 of 24 August 2016, pp: 22-42.
- EU (2020). Regulations Commission Regulation (EU) 2020/1245 of 2 September 2020 amending and correcting Regulation (EU) No. 10/2011 on plastic. OJ L 288 de 3 September 2020, pp: 1-17.

UNE (2010). UNE-EN 622-5:2010 Tableros de fibras. Especificaciones. Parte 5: Requisitos de los tableros de fibras fabricados por proceso seco (MDF).

UNE (2016). Norma UNE-EN ISO 12460-5:2016. Tableros derivados de la madera. Determinación de la emisión de formaldehído. Parte 5: Método de extracción (denominado del perforador). (ISO 12460-5:2015).

UNE (2021). Norma UNE-EN ISO 12460-3:2021. Tableros derivados de la madera. Determinación de la emisión de formaldehído. Parte 3: Emisión de formaldehído por el método de análisis de gas. (ISO 12460-3:2020).