EPD®

ENVIRONMENTAL PRODUCT DECLARATION (EPD)

ENVIRONMENTAL PRODUCT DECLARATION FOR PLAIN MEDIUM DENSITY FIBREBOARDS (MDF) AND FOR MELAMINE-COATED MEDIUM DENSITY FIBREBOARDS (MDF)

FINSA

	**Summary** **Environmental product declaration**
EPD® International System Anxo Mourelle Álvarez. EPD Verifier	**Verified by**
FINANCIERA MADERERA S.A. Carretera (National Road) N-550 km 15890 Santiago de Compostela – A Coruña	**Owner's declaration by**
The product is Medium density fibreboard (MDF), both plain as well as melamine-coated, commercially designated, in the case of plain boards, as: Fibranor, Fibrapan or Iberpan depending on their thickness); and Fibraplast, in the case of coated boards. The present environmental product declaration complies with standards ISO 14025, ISO 14040, ISO 14044 and describes the environmental features and behaviour of the construction product described herein. Its purpose is to promote compatible and sustainable environmental development of related construction methods. All relevant environmental data are disseminated in the present declaration, which has been submitted to independent validation by a third party. Presently there is no specific PCR for MDF boards.	**Construction product declaration**
December 2013(1) (1) Note: unless there is a variation greater than 5% on the environmental effects in any of the categories of impact.	**Validity**
This declaration is complete in itself and contains: - The product definition and physical data related to the preparation for being used in construction - Details of the base materials and on the origins thereof - Descriptions of how the product is manufactured and the intervening processes - Instructions on how to process the product - Data on the conditions of use, unusual effects, and on the end of the product's life cycle - The results from the total life cycle analysis (the model from cradle to gate B2B) - Evidence, verifications and tests supporting the stated features.	**Contents of the declaration**
15 December 2010	**Issuing date**
Sergio Blanco. FINSA Business Unit Director	**Manufacturer**
Anxo Mourelle. EPD Verifier	**Verified by**
 Sergio Blanco. FINSA Business Unit Director  Anxo Mourelle Álvarez. EPD Verifier	**Signatures**

Plain medium density fibreboards (MDF) or melamine-coated fibreboards are panel-like products that comply with standards EN 622-1, EN 622-5 and EN 14322. They are considered reliable products used as raw material for the construction and furniture industry. MDF boards can easily be coated with decorative paper, by resorting to simple technologies.	**Product description**
MDF boards are homogeneous and provide good results in the most demanding machine work. They are stable, as they keep their form and dimensions despite the changes in environment humidity and temperature. The multiple possibilities they offer in terms of framing, coating and finishing imply a greater quality of the end product and provide greater rationalization in terms of work. With the appropriate coating, they are the ideal support for manufacturing doors, frames, home and office furniture, screens, wall coverings, false ceilings and so on. In smaller thicknesses, it is a high-density board, with good wrap behaviour, and which is very easily stapled and curbed. They have great homogeneity and dimensional stability. These boards have become the strongest allies of different sectors: industrial electronics, backing of items of furniture, curbed structures for furniture and for covering walls, complementary automotive industry, machine packaging, fruit boxes… In greater thicknesses, for architectural applications such as columns, pillars, vaulted passageways, etc. Other possibilities include: shelves, bed heads, steps, benches, interior doors with moulded faces, table legs, etc. They are also used as basic material for wood veneering and PVC coatings.	**Applications**
The Life Cycle Analysis (LCA) was carried out according to standards ISO 14025; ISO 14040; ISO 14044. Both specific data from the production of the product under analysis as well as the following data bases were used: Ecoinvent 2.1 and the U.S. Life Cycle Inventory (USLCI). The methods used for calculating the categories of impact were as follows: the EPD Method (2008); the Environmental Design of Industrial Products Method (EDIP) 2003, and the Method of Cumulative Energy Demand (CED) v.1.07. The life cycle analysis covers the production of raw materials and energy: the transportation of raw materials, and the actual manufacturing stage, all the way to the shipping stage. The functional unit under consideration is 1 m^3 of plain MDF and 1 m^2 of melamine-coated MDF.	**Scope of application of the LCA**
In addition, the environmental product declaration also considers: - That formaldehyde complies with standard EN 120/EN 717-1 (Aitim Certification) - CARB P2 Certification - NAF Certification	**Other evidence and verifications**

Results

	Plain MDF boards (per m^3)		Coated MDF boards (per m^3)	
Variable under assessment	**Unit**	**Total**	**Unit**	**Total**
Emission of Greenhouse gases	kg CO2/ m^3	-818(1)	kg CO2/ m^2	-3,48
Potential depletion of the ozone layer (PDO)	kg R11 eq/ m^3	4,3E-5	kg R11 eq/ m^2	1,9E-7
Potential acidification (PA)	kg SO2/ m^3	4,68	kg SO2/ m^2	2,07E-2
Potential eutrophication (PE)	kg phosphate eq/ m^3	0,335	kg phosphate eq/ m^2	1.5E-3
Potential formation of photochemical oxidants (PFPO)	kg ethylene eq/ m^3	0,621	kg ethylene eq/ m^2	2,7E-3
Primary energy, non renewable	MJ/ m^3	11044	MJ/ m^2	51,37
Primary energy, renewable	MJ/ m^3	4919	MJ/ m^2	22,63
Electricity consumption	Kwh/ m^3	501	Kwh/ m^2	2,25

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1. Description of the manufacturing company

1.1 Tradition and innovation

Finsa is a pioneering company in manufacturing particle chip boards and MDF boards on the Iberian Peninsula.

The company, founded in 1931 as a small saw mill, has kept up sustainable growth even since.

FINSA currently manufactures a wide variety of wood-based products. Over the last few years, investment has focused mostly on expanding the company's international presence and on increasing its production capacity, especially in products with high added value within the technical wood processing chain: particle chip boards and melamine-coated MDF boards, plywood, veneered wood, frames, kitchen modules, components for furniture, laminate floors, etc.

Thanks to this, FINSA is now a world leader in the sector.

With great enthusiasm grounded in years of experience in the development of wood-based products, we would like you to take advantage of the opportunity to use technical wood boards in your projects and share our investment in the future of this material.

1.2 Entrepreneurial experience

Backed by 60 years dedicated to wood-based products, we are one of the leading companies in Europe.

We have twenty production centres and the most advanced technology in order to ensure the highest level of quality.

We boast a highly qualified human capital who identify with our company's values.

1.3 Future vision

A strong investment in innovation and an environmental policy based on sustainable development.

1.4 Focus on the customer

A swift and reliable logistics network: 450 vehicles out on the road daily.

Wood solutions designs that adapt to the needs of the market.

An entrepreneurial spirit: ready to learn, to improve and to take up new challenges in order to offer greater value to our customers every day.

1.5 Social responsibility

FINSA's commitment towards sustainable growth extends beyond the limits of our manufacturing facilities.

From Nature we get wood, our main raw material, and so our obligation is to respect it and protect it.

We develop initiatives regarding the collaboration with other public and private organizations that foster the protection and efficient management of forests.

1.6 The environment

Through our Environmental Policy we are actively committed to environmental protection.

We want the environmental impact of our manufacturing processes to be as small as possible.

As a result, we are one of the cleanest industries: we generate more energy than we consume processing our products.

Our production processes are optimized in order to achieve the maximum level of energy savings through cogeneration (by taking advantage of the energy and heat produced by the production facilities themselves) and achieve a minimum level of waste.

In addition, the waste generated by our activity and which has no other use is used for generating energy through our biomass production facilities, both in our own production processes in the plant as well as during the stage of use.

The life cycle model is the model specified below:

1.7 Scope of application of the Declaration

The present document applies to plain medium density fibreboards (MDF) and to melamine-coated MDF boards, manufactured by the Finsa Group. One of its most representative plants is located at:

FINANCIERA MADERERA S.A.

Polígono Industrial de Rábade (Industrial Site) (Apdo. 6)

27370 Rábade (Lugo)

Spain

2. Product definition

2.1 Product definition

Medium density fibreboards (MDF) are products manufactured from lignocellulose fibres obtained from carefully selected wood, bonded together with synthetic resins under pressure at high temperatures. The result is a reliable product which is used as raw material for the furniture and construction industry.

Plain MDF boards and melamine-coated MDF boards comply with standards EN 622-1, EN 622-5 and EN 14322. For a neat finishing, they can be easily coated with decorative papers, impregnated with melamine, using simple technologies.

These MDF boards are classified into different types according to the requirements set forth under standard EN 622-5, both according to their use (structural or non structural), and according to the type of environment where they are used (dry and humid).

2.2 Planned applications

MDF boards are homogeneous and provide good results in the most demanding types of machine work. They are stable, as they keep their form and dimensions despite changes in humidity and temperature in the environment.
The multiple possibilities they offer in terms of framing, coating and finishing imply greater quality of the end product and provide greater rationalization in terms of work.

With the appropriate coating, they are the ideal support for manufacturing doors, frames, home and office furniture, screens, wall coverings, false ceilings and so on.

In smaller thicknesses, they are high-density boards, with good wrap behaviour and very easily stapled and curbed. They have great homogeneity and dimensional stability.

They have become the strongest ally of various sectors: industrial electronics, backing for pieces of furniture, curbed structures for furniture and for covering walls, complementary automotive industry, machine packaging, fruit boxes…

In greater thicknesses, they can be used for architectural applications such as columns, pillars, vaulted passageways, etc. Other possibilities include: shelves, bed heads, steps, benches, interior doors with moulded faces, table legs, etc. They are also used as basic material for wood veneering and PVC coatings.

2.3 Main product standards

UNE-EN 622-1:2004 - Fibreboards. Specifications. Part 1: General requirements.

UNE-EN 622-5:2010 - Fibreboards. Specifications. Part 5: Requirements for fibreboards manufactured using dry processes (MDF).

UNE-EN 14322:2004 – Wood-derived boards. Melamine-coated boards for indoor use. Definition, requirements and classification.

UNE-EN 13986:2006 – Wood-derived boards for use in construction. Characteristics, conformity and brand evaluation.

2.4 Accreditations and certifications

CE marking according to standard EN 13986 –AENOR certification, if applicable.

Aitim Certification 9-3-05/E1 Medium density fibreboards (MDF) for furniture and carpentry.

Aitim Certification 9-6-01 Melamine boards for indoor applications.

Certification of the custody chain PEFC/1435-00006

Certification of the custody chain FSC: Certificate Code: TT-COC-003279

Possible Certification CARB Phase 2 and NAF Certification (with no added formaldehyde)

EN ISO 14001 – IQNet & AENOR

2.5 Tests and verifications

Formaldehyde:

Plain MDF boards have AITIM quality certification confirming that they comply with all Class E1 requirements (analyzed according to standard EN 120) defined under European Standard EN 622-1:2004.

AITIM Quality Certification:

Aitim Certification 9-3-05/E1 Medium density fibreboards – MDF- for furniture and carpentry.

MDF boards quality E-Z have Certificate of Conformity with CARB phase 2 of formaldehyde emissions, based on standard ASTM E 1333-96 (2002). In addition, the formaldehyde contents of these boards are less than or equal to 3 mg/100 g for dry boards, according to standard EN 120.

Certificate of conformity: Formaldehyde Emission Standard: Phase 2 (0.11 ppm) In compliance with the provisions of California Code Regulation 93120 concerning Airbone Toxic Control Measures to reduce Formaldehyde Emissions from Composite Products.

MDF boards quality “Exterior” have NAF Certification – ‘No added formaldehyde resins’ according to section 93120.3, title 17, of the CARB Regulation.

Melamine-coated MDF boards have AITIM quality certification confirming that they comply with all the requirements of European standard EN 14322.

AITIM Quality Certification:

Aitim Certification 9-6-01 Melamine boards for indoor applications.

3. Raw materials and composition

3.1 Primary and secondary materials, and additives

MDF boards with thicknesses ranging from 1.8 mm to 70 mm with an average density between 700 and 800 kg/m3, have the following make-up:

Wood (mainly pine and eucalyptus wood used): 80-88%

Resin Urea – Formaldehyde: 7 - 13%

Water: 4 - 9%

Paraffin emulsion: 0.5 - 2 %

Paper impregnated with MUF resins: 160 g/m2

Wood: The production of MDF boards uses only green timber, most of which is pine and eucalyptus wood, as well as waste from sawmills.

UF Glue: consists of a urea-formaldehyde resin.

Paraffin emulsion: a paraffin emulsion is added to the formulation during the bonding process, thus enhancing the boards’ water resistance.

Resin from melamine-urea-formaldehyde: resin for impregnating decorative paper.

During the board’s pressing process resin fully hardens and generates a smooth, hard and resistant surface, upon which the paper can be applied, in the case of coated boards.

3.2 Extraction and origin of raw materials:

Wood comes predominantly from regional forest areas. This wood comes from forests situated within a radius of approx. 100 km from the production site. Transportation distances tend to be small in order to keep to a bare minimum, all logistic costs with the acquisition of raw materials.

Preference is given to forests certified according to the FSC or PEFC standards in the wood selection process.

PEFC and FSC certified products can be supplied upon request.

The adhesive agents and impregnation resins or, if such is the case, the raw materials for their production, come from suppliers situated no further than 150 km away from the production site.

3.3 Local and general availability of raw materials

The wood used in the production of MDF boards is obtained first and foremost from sustainably managed forests. The forest areas from where wood is collected may be forests owned by the company, or private forest areas situated close to the MDF production facilities. Wood selection includes green timber from forest clearing and forestry, as well as waste from saw mills (wood chips).

All resin used, as well as the paraffin emulsion, are synthesized in manufacturing facilities belonging to the Group.

4. Manufacturing process. Key processes (Core Business)

4.1 The different stages of the manufacturing process:

Manufacture of plain particle boards:

1. Debarking the wood trunks
2. Chipping and grinding the wood
3. Cleaning the wood chips and the feeding system from the wood storage
4. Steam digestion of wood chips
5. Refining and de-fibreing
6. Bonding the fibres with resins
7. Drying the fibres in approx. 2-3% of residual contents of humidity
8. Transportation and internal storage of fibres
9. Formation of fibre sheets
10. Compressing the fibre sheets using continuous hot pressing
11. Cutting and edging the fibre strips in order to obtain the required board sizes
12. Sanding the upper and lower surfaces
13. Intermediate storage and packing

From the plain MDF board, the following stages are added in the coating lines:

1. Placing the impregnated paper on the top / lower side of the board surfaces (Forming the ‘Sandwich’).
2. Hot pressing
3. Trimming the extra paper on the edges after pressing
4. Classification and piling
5. Packing the product and preparation for shipping.

All waste generated during the production process (waste from cutting the boards, chip waste, and debarking or sanding waste) and which can no longer be reused in the process, is, without exception, forwarded to a thermal reusing process. It is kept in storage in the wood park and fed from the wood park along with the stored material that was purchased in the market.

4.2 Health and safety during production

Throughout the whole process, FINSA’s production centre adopts preventative measures for workers enforced by the existing standards. As well as preventative measures, this includes regular control of exposure according to the types of risks.

The results obtained are well below the limit values set forth by law and are supervised by the competent authorities.

4.3 Environmental protection throughout the process

The production centre complies with all authorizations and permits defined by Law, issued by environmental authorities, both with an integrated nature as well as in relation to the protection of the various aspects.

Emissions into the atmosphere: the installation cleanses the exhaust gases from each process to values well below the limit values for emissions. Quality control of the environmental air is supervised by the official surveillance network for air quality. Whenever applicable, FINSA demands that its suppliers provide evidence that they comply with the legal requirements for the value chain.

Water and soil protection: this is a process with a scarce water flow and there is a treatment station for processing all the waters which are then returned to the environment within the limit values set forth by the environmental authorities.

There are protection systems for drainage waters, both for the wood parks and for the plant.

The soils are impermeable and have secondary retention tanks. Additionally, in the chemical storage warehouses, all applicable standards are complied with.

Protection against noise and vibrations: prevention and protection measures have been adapted to guarantee that all legal requirements that have been defined are complied with, both within and outside the facilities.

5. Conditions of use

5.1 Components

The components of the plain and melamine-coated MDF boards correspond to those specified under the item "raw materials". The bonding agents are chemically inert and are strongly bonded to the wood by gelification. Formaldehyde emissions are negligible (at least all boards manufactured by FINSA comply with class E1).

5.2 Environment–Health interactions

Environmental protection:

According to the present state of knowledge, with the appropriate use of the product described there are no risks for water, air or soil.

Health protection:

Health aspects: No health-related damage or limitations are expected under normal conditions of use, as provided for MDF boards. Natural substances present in natural timber could be released in small amounts. With the exception of small amounts of formaldehyde, which are harmless to human health, no emissions of contaminants are detected.

5.3 Useful life

Useful life under conditions of common use is defined through the class of application set forth for the product according to standard EN 622-5.

6. End of life of the product

Reuse: For example, at the end of a stage of use of a given building, the boards can be separated and can be reused for the same applications.

Recovery/Recycling: For example, at the end of a stage of use of a given building, the boards can be separated and can be reused for applications that differ from their original applications.

Power Generation: All wooden boards should be reused or recycled whenever possible. Whenever this is not possible, their end of life shall be the generation of power at a biomass plant, which is always preferable to sending them to a landfill.

7. Principles and criteria for product Life Cycle Analysis (LCA)

7.1 Definition of functional unit

The present declaration refers to the manufacture of a cubic meter of plain MDF boards and one m^2 of melamine-coated MDF boards, with average characteristics.

The average density is 840 kg/m3 (± 20 Kg, with relative humidity of around 7 %)

7.2 Reference PCR document

There is currently no specific PCR for MDF boards.

The Spanish National Association of Wooden Boards – ANFTA (Asociation Nacional de Fabricantes de Tableros de España) prepared the PCR "Fibreboard and particle board of wood or other ligneous materials", version 1.0, 2011-03-10, currently being reviewed by EPD, pending its publication.

7.3 System limits

The limits that have been selected for the system cover the manufacture of melamine-coated MDF boards including the production of raw materials up to the point of the final packed product at the factory gate (life cycle designated from cradle to gate).

The Ecoinvent's database was consulted throughout the whole life cycle analysis.

The processes observed in detail were as follows:

- The forest stage, for wood procurement and transportation
- The transportation of all relevant raw materials for the process.
- The manufacturing process of plain MDF boards and melamine-coated MDF boards.
- The packing process and thermal use as the final closure of the life cycle.
- Infrastructure processes fall outside the scope of the system.

The stage related to the use of plain MDF boards and melamine-coated MDF boards has not been researched in the present declaration. It is assumed that the end of the life cycle is energy recovery at a biomass plant (considered as the closure of the cycle: from cradle to grave).

Note on the stage of use: the conditions of use, as well as any possible uncommon effects associated with it, were not studied when valuing the life cycle analysis.

7.4 Inclusion of transportation and logistics

The transportation of raw materials and secondary materials that were used, as well as the transportation of the waste that was generated, were also included in the study.

7.5 Period of reference for life cycle analysis

The data used refers to actual production processes during the fiscal year from 01/01/2008 to 31/12/2008. The life cycle evaluation was prepared for Spain as the area of reference**.**

The reference period is selected by considering as the basis the fact that in the closest year to the life cycle analysis evaluation (2009), a stop is generated in the productive process in one of the manufacturing lines of MDF boards, and as such, that year would not be representative.

7.6 Background

The following data sources were used for modelling the life cycle analysis: Ecoinvent 2.1 and U.S. Life cycle Inventory (USLCI). In addition, contrast methods regarded as international references were also used for calculating the different categories of impact: EPD Method (2008), the Environmental Design of Industrial Products (EDIP) 2003 Method, and the Cumulative Energy Demand (CED) Method v.1.07.

All the relevant data records for board manufacturing, as well as waste disposal, were taken from the above mentioned databases.

7.7 Criteria for calculating the life cycle analysis

The results from the life cycle analysis are based on the following assumptions:

Transportation of all raw materials and / or secondary materials is calculated according to the means of transportation that were used, using data from Ecoinvent 2.1 and from the U.S. Life Cycle Inventory (USLCI).

The invoices from the power supply companies were considered for calculating the power supply used in the manufacturing process.

All waste that is generated during production and which cannot be re-circulated into the process (cutting and milling waste) is sent to be used as fuel for the biomass boiler.

The closure of the life cycle is assumed to be the thermal use of waste at a biomass generation plant.

7.8 Data quality

The data used is less than 5 years old, which is set forth as the maximum under the General Program Instructions (GPI, Environdec v.1.0, 2008-02-29).

All data were obtained directly from FINSA facilities and from suppliers. In order to assess in detail the quality of the data in use, a dual exercise was carried out:

Identification of the primary/secondary nature of each data.

Maximum percentage in mass/energy for any category of impact per stage of the most relevant data.

After analyzing the data, it was concluded that they are very representative and comply with 90% of the primary data required by the applicable standards and regulations.

In addition, it is inferred that the stages with greater weight in terms of the environmental footprint are as follows: Stage of energy source, Stage of environmental impact, Stage of glue supply, and drying stage.

7.9 Allocation and interpretation criteria

Allocation refers to the allocation of input and output flows to and from a product life cycle module that is being researched according to the criteria set forth under standard ISO 14040.

Waste materials from the process, such as wood waste, are used as a source of energy via a biomass boiler. In order to calculate combustion levels, the databases from Ecoinvent 2.1 and U.S. Life Cycle Inventory (USLCI) have been used.

Allocation of the different factors of the categories of impact that were studied in the case of electricity consumption was calculated based on the Spanish average for electricity sources. Calculation of emissions (for instance, CO2, HCl, SO2 or particles), depending on inputs, was carried out based on emission controls performed periodically at the facilities, as required by the applicable environmental standards and according to the volume of exhaust gases from the emission sources.

The categories of impact that were considered for impact assessment associated with the production of wooden boards are as follows:

- Emission of greenhouse gases
- Potential depletion of the ozone layer (PDO)
- Potential acidification (PA)
- Potential eutrophication (PE)
- Potential formation of photochemical oxidants (PFPO)
- Primary energy, non renewable
- Primary energy, renewable
- Consumption of electricity

8. Results from the Life Cycle Analysis

The following chapter assesses the product life cycle inventory in relation to the consumption of primary energy and waste; below is a description of the assessment of the categories of impact that were considered.

8.1 Life cycle inventory

The life cycle model that was chosen is called “from cradle to gate”, covering all the operations from felling timber and cutting the wood required for manufacturing the boards until the fully finished product is obtained.

The data that feed the calculation process represent the manufacturing process of wooden boards for the production period from the 1st of January 2008 to the 31st of December 2008. This is mainly primary data for the most part, collected directly from reliable sources that can be divided into the following categories:

- Delivery notes from material delivered or supplied
- Map distances
- Invoices
- Direct measurements
- Counters
- Product data sheets

The actual life cycle analysis is carried out through a spreadsheet, where all the data collected in the inventory are entered and classified, by production stages.

The EPD, the Cumulative Energy Demand (CED) and the EDIP (Environmental Design of Industrial Products) methods are used in order to assign to each data collected, the factors in all categories of impact required for fulfilling the environmental product declaration.

The sum of all data multiplied by each factor of the categories of impact result in the final figure called the ecological footprint.

8.2 Consumption of primary energy during the life cycle

The following table shows the total consumption of primary energy (renewable and non renewable) in the production process from cradle to gate:

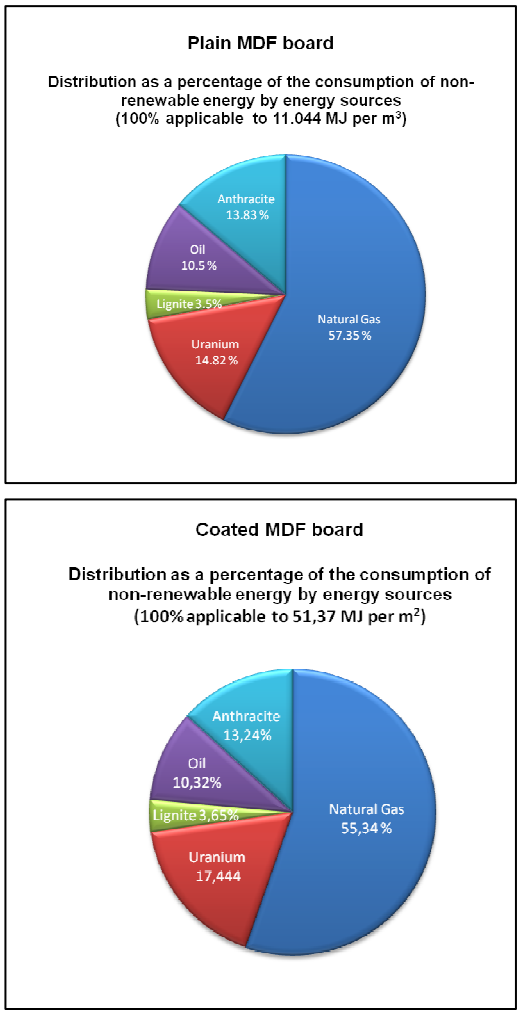
Table 1: Consumption of primary energy for manufacturing 1 m^3 of plain MDF board and 1 m^2 of melamine-coated MDF board.

	Plain MDF board (per m^3)		Coated MDF board (per m^2)	
Variable under assessment	**Unit**	**Total**	**Unit**	**Total**
Primary energy, non renewable	MJ/m^3	11.044	MJ/m^2	51,37
Primary energy, renewable	MJ/m^3	4.919	MJ/m^2	22,63

In both cases, the consumption of non-renewable energy is greater than the consumption of renewable energy.

The following figures depict the percentage of consumption of non-renewable energy by energy source that is produced throughout the whole life cycle, both the consumption produced during the manufacturing process, as well as the production of raw materials used and the energy employed for their manufacture:

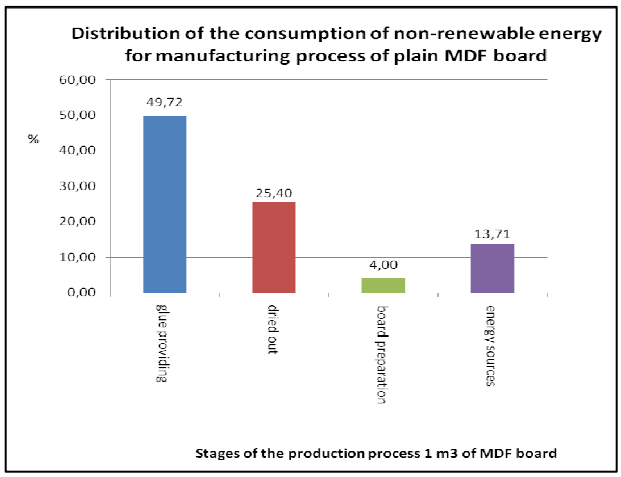
Figure 1. Distribution as a percentage of the consumption of non-renewable energy by energy sources



A more detailed analysis of the consumption of non-renewable energy for manufacturing one m^3 of plain MDF and one m^2 of melamine-coated MDF (figure 4), shows that energy consumption is similar in both cases: natural gas represents a higher percentage of primary energy consumed.

When the distribution of energy consumption per stage of the life cycle process is assessed, the following distributions are obtained:

Figure 2. Distribution of the consumption of non-renewable energy per process stage, in MJ



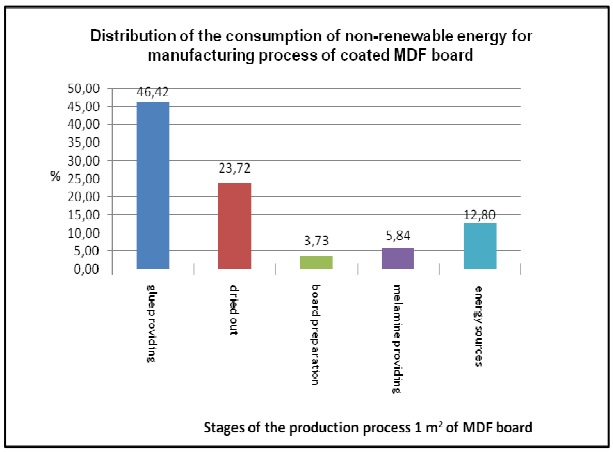


Figure 2 provides the detailed consumption of non-renewable energy per stage of the life cycle process, for manufacturing plain MDF boards and melamine-coated MDF boards.

In both cases it is detected that the process stage with the highest energy consumption is shown to be the glue supply stage, followed by the energy source stage.

Table 2 represents the consumption of primary energy for manufacturing 1 m^3 of plain MDF boards and 1 m^2 of melamine-coated MDF. In both cases, this results n higher MJ from the consumption of non-renewable primary energy with energy contents.

Table 2: Consumption of primary energy for manufacturing 1 m³ of MDF and 1 m^2 of melamine-coated MDF.

	Plain MDF board (per m^3)		Coated MDF board (per m^2)	
Variable under assessment	**Unit**	**Total**	**Unit**	**Total**
Non-renewable primary energy with energy contents	MJ/m^3	9.327	MJ/m^2	42,07
Renewable primary energy with energy contents	MJ/m^3	4.566	MJ/m^2	21,03

8.3 CO_2 balance

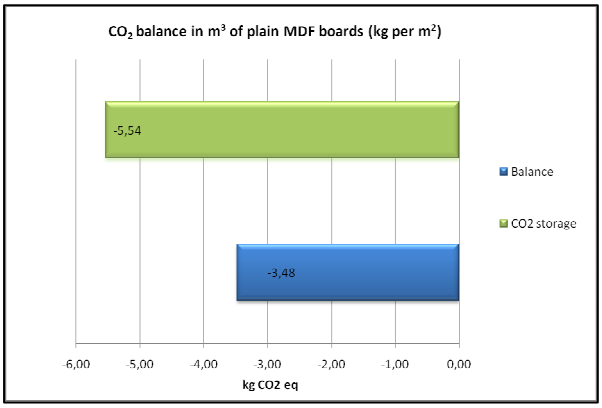
The amount of CO_2 stored in the product was considered for carrying out this balance, considering the process of air absorption by wood during its growth. For such calculation we shall consider the hypothesis of 1.851 kg of CO_2 stored per kg of dry wood. The amount of CO_2 stored is calculated considering the board density and its wood contents.

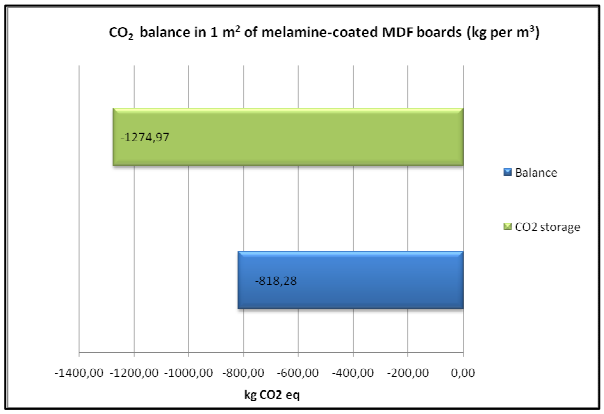
The CO_2 balance in figure 3 shows that manufacturing one m³ of plain MDF board generates 456.68 kg of CO2 per m^3, and in the case of melamine-coated MDF boards it generates 2.06 kg of CO2 per m^2.

On the other hand, a total of 1,274.97 kg of CO2 per m^3 is removed from the air and stored in wood through photosynthesis in plain MDF boards. The overall balance is -818.28 kg CO2 eq.

A total of 5.54 kg CO_2 per m^2 is removed from the air and stored in MDF boards coated with melamine. The overall balance is -3.48 kg of CO2 eq.

Figure 3. CO_2 balance in 1 m^3 of plain MDF boards and in 1m^2 of melamine-coated MDF boards.





8.4 Related waste production

Calculating the waste produced from manufacturing 1 m³ of plain chipboard and 1 m^2 of melamine-coated chipboard includes the total of hazardous and non-hazardous waste:

Table 3: Waste generation

	Plain MDF boards (per m^3)		Coated MDF boards (per m^2)	
Variable under assessment	**Unit**	**Total**	**Unit**	**Total**
Non-hazardous Waste	kg	20,29	kg	9,02E-2
Hazardous Waste	kg	0,03	kg	1,6E-4

8.5 Absolute contribution of each functional units for each category of impact

The following table shows the absolute contributions from manufacturing 1 m³ of plain MDF boards and 1 m^2 of melamine-coated MDF boards, for each category of impact set forth in the applicable standards:

Table 4. Categories of impact for manufacturing 1 m^3 of plain MDF board and 1 m^2 of melamine-coated MDF board:

	Plain MDF boards (per m^3)		Coated MDF boards (per m^2)	
Variable under assessment	**Unit**	**Total**	**Unit**	**Total**
Emission of green house gases	kg CO2/ m^3	-818(1)	kg CO2/ m^2	-3,48
Potential depletion of the ozone layer (PDO)	kg R11 eq/ m^3	4,3E-5	kg R11 eq/ m^2	1,9E-7
Potential acidification (PA)	kg SO2/ m^3	4,68	kg SO2/ m^2	2,07E-2
Potential eutrophication (PE)	kg phosphate eq/ m^3	0,335	kg phosphate eq/ m^2	1.5E-3
Potential formation of photochemical oxidants (POFP)	kg ethylene eq/ m^3	0,621	kg ethylene eq/ m^2	2,7E-3
Primary energy, non renewable	MJ/ m^3	11044	MJ/ m^2	51,37
Primary energy, renewable	MJ/ m^3	4919	MJ/ m^2	22,63
Electricity consumption	Kwh/ m^3	501	Kwh/ m^2	2,25

9. Validity of the declaration

The validity established for the environmental declaration for medium density fibreboards (MDF), both plain and melamine-coated, is 3 years (until December 2013) as the sensitivity of former years has been tested and there are no variations over 5% regarding the environmental effects in any of the categories of impact.

10. Verification

The present declaration has been developed according to standards ISO 14025, ISO 14040, and ISO 14044.

Independent verification according to ISO 14025:

[ ] internal [X] external

Validation of the present declaration by:

Anxo Mourelle Álvarez

11. Annexes

11.1 Life Cycle Model

11.2 Technical features and Standard Formats

Plain MDF boards manufactured by FINSA have different denominations depending on their thickness:

Fibranor: thicknesses less than or equal to 7mm

Fibrapan: thicknesses between 7 and 30 mm

Iberpan: thicknesses over 30 mm

Fibraplast: thicknesses below 15 mm, between 15 and 20 mm and over 20 mm

The following files are the technical data sheets for each product:

Figure 1: TECHNICAL SPECIFICATIONS FOR FIBRANOR

FINSA www.finsa.com

FIBRANOR ®

TECHNICAL DATA - AVERAGE VALUES — **Rev: 24/04/2008**

TEST METHOD	PROPERTIES	UNITS	THICKNESSES mm							
			1,8/2,5	>2,5/4	>4/6					
EN 323	DENSITY (*)	kg/m3	850	825	800					
EN 319	INTERNAL BOND	N/mm2	0,90	0,90	0,85					
EN 310	BENDING STRENGTH	N/mm2	38	38	38					
EN 310	MODULUS OF ELASTICITY	N/mm2	---	---	2700					
EN 317	THICKNESS SWELLING 24 H	%	45	35	28					
EN 318	DIMENSIONAL MOVEMENT LENGTH/WIDTH	%	0,4	0,4	,.4					
EN 318	DIMENSIONAL MOVEMENT THICKNESS	%	10	10	10					
EN 311	SURFACE SOUNDNESS	N/mm2	>1,2	>1,2	>1,2					
EN 382-1	SURFACE ABSORPTION (TWO FACES)	mm	> 150	> 150	> 150					
EN 322	MOISTURE CONTENT	%	7+/-3	7+/-3	7+/-3					
ISO 3340	GRIT CONTENT	% Weight	≤ 0,05	≤ 0,05	≤ 0,05					

TOLERANCE ON NOMINAL DIMENSIONS

TEST METHOD	PROPERTIES	UNITS	THICKNESSES mm							
			1,8/2,5	>2,5/4	>4/6					
EN 324-1	THICKNESS	mm	Sanded: +/-0,15 Un-sanded: +/-0,20	Sanded: +/-0,15 Un-sanded: +/-0,20	Sanded: +/-0,15 Un-sanded: +/-0,20					
EN-324-1	LENGTH/WIDTH	mm	+/- 2 mm/m.	+/- 2 mm/m.	+/- 2 mm/m.					
EN 324-2	SQUARENESS	mm/m	+/-1.5 mm/m.	+/-1.5 mm/m.	+/-1.5 mm/m.					
EN-324-2	EDGE STRAIGHTNESS	mm/m	+/-1.5 mm/m.	+/-1.5 mm/m.	+/-1.5 mm/m.					

(*) THIS INFORMATION IS REGARDED AS MERELY INDICATIVE.

Figure 2: TECHNICAL SPECIFICATIONS FOR FIBRAPAN

FINSA
www.finsa.com

FIBRAPAN ®

TECHNICAL DATA - AVERAGE VALUES | Rev: 08/08/2008

TEST METHOD	PROPERTIES	UNITS	THICKNESSES mm							
			7/9	>9/12	>12/19	>19/30				
EN 323	DENSITY (*)	kg/m3	790/750	750/730	740/710	710/675				
EN 319	INTERNAL BOND	N/mm2	0,65	0,65	0,60	0,60				
EN 310	BENDING STRENGTH	N/mm2	30	30	30	25				
EN 310	MODULUS OF ELASTICITY	N/mm2	2700	2500	2500	2100				
EN 317	THICKNESS SWELLING 24 H	%	17	15	12	10				
EN 318	DIMENSIONAL MOVEMENT LENGTH/WIDTH	%	0,4	0,4	0,4	0,3				
EN 318	DIMENSIONAL MOVEMENT THICKNESS	%	6	6	6	5				
EN 311	SURFACE SOUNDNESS	N/mm2	1,2	1,2	1,2	1,2				
EN 382-1	SURFACE ABSORPTION (TWO FACES)	mm	> 150	> 150	> 150	> 150				
EN 322	MOISTURE CONTENT	%	7+/-3	7+/-3	7+/-3	7+/-3				
ISO 3340	GRIT CONTENT	% Weight	≤ 0,05	≤ 0,05	≤ 0,05	≤ 0,05				
EN-320	SCREW HOLDING. EDGE	N	-	-	800	750				
EN-320	SCREW HOLDING. SURFACE	N	-	-	1000	1000				

TOLERANCE ON NOMINAL DIMENSIONS										
TEST METHOD	**PROPERTIES**	**UNITS**	**THICKNESSES mm**							
			7/9	>9/12	>12/19	>19/30				
EN 324-1	THICKNESS	mm	+/-0,2	+/-0,2	+/-0,2	+/-0,3				
EN-324-1	LENGTH / WIDTH	mm	+/- 2 mm/m, max +/- 5 mm.	+/- 2 mm/m, max +/- 5 mm.	+/- 2 mm/m, max +/- 5 mm.	+/- 2 mm/m, max +/- 5 mm.				
EN 324-2	SQUARENESS	mm/m	+/- 2	+/- 2	+/- 2	+/- 2				
EN-324-2	EDGE STRAIGHTNESS	mm/m	+/-1.5	+/-1.5	+/-1.5	+/-1.5				

(*) THIS INFORMATION IS REGARDED AS MERELY INDICATIVE.

Figure 3.TECHNICAL SPECIFICATIONS FOR IBERPAN

FINSA www.finsa.com

IBERPAN ®										
TECHNICAL DATA - AVERAGE VALUES									**Rev: 13/08/2008**	
TEST METHOD	**PROPERTIES**	**UNITS**	**THICKNESSES mm**							
			>30/45	>45/60	>60/70					
EN 323	DENSITY (*)	kg/m3	700/680	675/640	610					
EN 319	INTERNAL BOND	N/mm2	0,55	0,50	0,50					
EN 310	BENDING STRENGTH	N/mm2	20	17	16					
EN 310	MODULUS OF ELASTICITY	N/mm2	2000	1800	1700					
EN 317	THICKNESS SWELLING 24 H	%	8	6	6					
EN 318	DIMENSIONAL MOVEMENT LENGTH/WIDTH	%	0,25	0,25	0,25					
EN 318	DIMENSIONAL MOVEMENT THICKNESS	%	5	5	5					
EN 311	SURFACE SOUNDNESS	N/mm2	1,2	1,2	1,2					
EN 382-1	SURFACE ABSORPTION (TWO FACES)	mm	>150	>150	>150					
EN 322	MOISTURE CONTENT	%	7+/-3	7+/-3	7+/-3					
ISO 3340	GRIT CONTENT	% Weight	≤ 0.05	≤ 0.05	≤ 0.05					
EN-320	SCREW HOLDING. EDGE	N	700	700	700					
EN-320	SCREW HOLDING. SURFACE	N	1000	1000	1000					

TOLERANCE ON NOMINAL DIMENSIONS										
TEST METHOD	**PROPERTIES**	**UNITS**	**THICKNESSES mm**							
			>30/45	>45/60	>60/70					
EN 324-1	THICKNESS	mm	+/-0,3	+/-0,3	+/-0,3					
EN-324-1	LENGTH/WIDTH	mm	+/- 2 mm/m max +/- 5 mm.	+/- 2 mm/m max +/- 5 mm.	+/- 2 mm/m max +/- 5 mm.					
EN 324-2	SQUARENESS	mm/m	+/-2	+/-2	+/-2					
EN-324-2	EDGE STRAIGHTNESS	mm/m	+/-1.5	+/-1.5	+/-1.5					

(*) THIS INFORMATION IS REGARDED AS MERELY INDICATIVE.

Figure 4. TECHNICAL SPECIFICATIONS FOR FIBRAPLAST

Melamine-coated MDF boards are called Fibraplast:

FINSA www.finsa.com

FIMAPLAST / FIBRAPLAST/SUPERPAN DECOR/ ®										
TECHNICAL DATA - AVERAGE VALUES									**Rev: 29/04/2008**	
TEST METHOD	**PROPERTIES**	**UNITS**	**THICKNESSES mm**							
			<15	**15-20**	**>20**					

TOLERANCE ON NOMINAL DIMENSIONS										
TEST METHOD	**PROPERTIES**	**UNITS**	**THICKNESSES mm**							
			<15	15-20	>20					
UNE-EN-14323	THICKNESS ON NOMINAL DIMENSIONS	mm	+/-0,3 (AI,AV) +0,5/-0,3 (AH)	+/-0,3 (AI,AV) +0,5/-0,3 (AH)	+/- 0,5					
UNE-EN-14323	THICKNESS WITHIN THE BOARD	mm	max-min <0,6	max-min <0,6	max-min <0,6					
UNE-EN-14323	LENGHT & WIDTH	mm	+/-5	+/-5	+/-5					
UNE-EN-14323	FLATNESS (SOLAMENTE EN REVESTIMIENTOS EQUILIBRADOS)	mm/m	-	≤2	≤2					

COATING PROPERTIES			
UNE-EN 14323	RESISTANCE TO SCRATCHING	N	≥ 1.5
UNE-EN 14323	RESISTANCE TO CRACKING	Rating	≥ 3
UNE-EN 14323	SURFACE ASPECT	Rating	4
UNE-EN 14323	RESISTANCE TO STAINING	Rating	≥ 3
VISUAL DEFECTS			
UNE-EN 14323	EDGES DAMAGED	mm/m	≤ 10
UNE-EN 14323	SURFACE DEFECTS. POINTS	mm2/m2	≤ 2
UNE-EN 14323	SURFACE DEFECTS. LENGHT	mm/m2	≤ 20

	RESISTANCE TO ABRASION:	CLASS	IP NUMBER OF TURNS	WR NUMBER OF TURNS
UNE-EN 14323	RESISTANCE TO ABRASION: DESIGNS (GENERAL APPLICATIONS)	1	<50	<150
UNE-EN 14323	RESISTANCE TO ABRASION. UNICOLORS AND HORIZONTAL APPLICATIONS (AH)	3A	≥ 150	≥ 350

MDF boards, either plain or melamine-coated are available in a wide range of sizes which can be found in our website: www.finsa.com

11.3 Managing finished products

Recommendations for storing products:

All products should always be stored under a roof and on a flat surface.

The optimal storage conditions are 65% relative humidity, and either more humid or drier environments should be avoided.

Always avoid any direct contact with water.

Runners should always be vertically aligned.

The maximum storage height is 4 bales.

If packaging gets damaged during handling, it must be repackaged for the proper conservation of the product.

Recommendations for processing the product:

Plain or melamine-coated MDF boards can be normally sawn and drilled using common tools. The corresponding IPEs should always be used, for instance, a mask when hand tools are used without a dust-extracting device.

Labour and environmental protection:

All standard safety measures should be applied when processing or installing MDF boards. Such measures are specified in the product handbooks that are delivered to the customer.

The main effects on the environment during the preparation stage of finished products refer to dust emissions which can be prevented using conventional extraction systems.

Waste such as waste from packing the product, is non-hazardous waste that complies with the criteria set forth in the European Directive and can be handled according to the guidelines set forth in the appropriate facilities, for proper recycling (plastic waste, retractable film, strips, etc)

Waste materials

Waste material accumulated during installation or processing work (cutting and package waste) shall be collected and separated according to their type and according to the applicable type at the point of destination. Wood components re-enter the process as fuel for biomass boiler.

Environment–Health interactions

According to the current status of knowledge, under the appropriate use of the product described, there are no risks for water, air and soil.

In addition, no health-related damage or limitations are expected under normal conditions of use, as provided for MDF boards. During their use, natural substances present in natural timber could be released in small amounts. With the exception of small amounts of formaldehyde, which is harmless to human health, no significant levels of emissions of contaminants are detected.

11.4 Uncommon effects

Fire:

Fire reaction

Fire reaction of plain MDF or melamine-coated boards with thickness > 9mm and density > 600 kg/m3

Main classification according to Combustibility: D according to standard EN 13501-1 (Cf requirements set forth under standard EN 13986)

Additional classifications:

Smoke opacity: s2 average opacity

Fall of swollen drops or particles: d0 no drops or particles fall

Fire reaction of MDF Fire-resistant boards, either plain or melamine-coated:

Main classification according to Combustibility: B according to standard EN 13501-1 (Cf requirements set forth under standard EN 13986)

Additional classifications:

Smoke opacity: s2 average opacity

Fall of swollen drops or particles: d0 no drops or particles fall

Fire-fighting measures:

Special measures: Not classified as inflammable. Its complete combustion releases carbon dioxide (CO2), with carbon monoxide (CO) released whenever there is incomplete combustion.

Individual protection equipment:

Self-contained breathing equipment should be used in the event of major fires.

Means of extinction: Water, chemical powder or foam.

Stability and reactivity:

Conditions to be avoided: Unknown

Materials to be avoided: Unknown

Hazardous decomposition products: Cf fire-fighting measures

Toxicological information:

Acute toxicity (irritation, sensitivity etc.): Unknown

Chronic effects: Risk of slight skin irritation and risks to the respiratory tract.

Ecological information:

Level of degradability:	100 %
Mobility:	Boards are not water soluble
Ecotoxicity:	LC 50: not available
	IC 50: not available

Effects upon water:

There are no components that can be dangerous for wash water. The wooden boards are not resistant to continued water exposure. The recommendations for use should be complied with.

Mechanical destruction:

The standard of rupture of an MDF board demonstrates relatively fragile behaviour, and sharp edges may develop (injury risks).

11.5 References

Requirements for Environmental Product Declarations, EPD, (MSR 1999:2), published by the Swedish Council for Environmental Management available in: www.environdec.com

SimaPro 7, software and database. PRé Consultans 2010.

The international standards of reference are as follows:

ISO 14040:2006, Environmental management. Life cycle analysis. Principles and reference framework

ISO 14025:2006 Labels and environmental declarations. Environmental declarations type III. Principles and procedures

ISO 14044:2006, Environmental management. Life cycle analysis. Requirements and guidelines

UNE-EN 622-5:2010, Fibreboards. Specifications. Part 5: Requirements for fibreboards manufactured using dry processes (MDF).

UNE-EN 14322:2004, Wood-based panels. Melamine-coated wood boards for indoor use. Definition, requirements and classification.

UNE-EN 13986:2006, Wood-based panels for construction. Characteristics, conformity and brand evaluation.

prEN 15804, Sustainability of Construction Works. Environmental product declarations. Product Category Rules.

11.4 Product pictures

Figure 1: Finished product_ plain MDF boards

Figure 2: Packed product ready for shipping_ Plain MDF boards

Figure 3: Finished product _ Melamine-coated MDF boards

Figure 4: Packed product ready for shipping_ Melamine-coated MDF boards