

ENVIRONMENTAL PRODUCT DECLARATION

MEDIUM DENSITY FIBERBOARD

ROSEBURG FOREST PRODUCTS COMPANY



Medium density fiberboard



Founded in 1936, Roseburg Forest Products is a privately-owned company. Roseburg manufactures stud lumber, softwood and hardwood plywood, engineered wood including I-joists and laminated veneer lumber. Roseburg is one of North America's leading producers of particleboard, medium density fiberboard, and thermally fused laminates. The company owns and sustainably manages more than 600,000 acres of timberland in Oregon, North Carolina and Virginia, as well as an export wood chip terminal facility in Coos Bay, Oregon. Roseburg products are shipped throughout North America and the Pacific Rim.





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According to ISO 14025,
EN 15804, and ISO21930:2017

EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE	UL Environment 333 Pfingsten Road Northbrook, IL 60611 https://www.ul.com/ https://spot.ul.com
GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER	General Program Instructions v.2.4 July 2018
MANUFACTURER NAME AND ADDRESS	Roseburg Forest Products Company 3660 Gateway Street, Springfield, OR 97477
DECLARATION NUMBER	4789110727.101
DECLARED PRODUCT & FUNCTIONAL UNIT OR DECLARED UNIT	Medium Density Fiberboard, 1 m ³
REFERENCE PCR AND VERSION NUMBER	UL Part B: Structural and Architectural Wood Products, v1 (October 21, 2019)
DESCRIPTION OF PRODUCT APPLICATION/USE	Cabinetry, furniture, shelving, casework, wall panels, moulding, millwork, elevator panels, thermally-fused laminate panels, and core for hardwood plywood panels
PRODUCT RSL DESCRIPTION (IF APPL.)	N/A
MARKETS OF APPLICABILITY	North America
DATE OF ISSUE	July 1, 2020
PERIOD OF VALIDITY	5 Years
EPD TYPE	Product Specific
RANGE OF DATASET VARIABILITY	N/A
EPD SCOPE	Cradle-to-gate
YEAR(S) OF REPORTED PRIMARY DATA	2018
LCA SOFTWARE & VERSION NUMBER	GaBi ts v9.1
LCI DATABASE(S) & VERSION NUMBER	GaBi 2019 (service pack 38)
LCIA METHODOLOGY & VERSION NUMBER	TRACI 2.1

This PCR review was conducted by:	UL Environment
	PCR Review Panel
	epd@ulenvironment.com
This declaration was independently verified in accordance with ISO 14025: 2006. <input type="checkbox"/> INTERNAL <input checked="" type="checkbox"/> EXTERNAL	
	Grant R. Martin, UL Environment
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	
	Thomas P. Gloria, Industrial Ecology Consultants

LIMITATIONS

Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc.

Accuracy of Results: EPDs regularly rely on estimations of impacts; the level of accuracy in estimation of effect differs for any particular product line and reported impact.

Comparability: EPDs from different programs may not be comparable. Full conformance with a PCR allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible. Example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared.



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1. Product Definition and Information

1.1. Description of Organization

Medium Density Fiberboard (MDF) is manufactured by Roseburg Forest Products in Medford, OR.

1.2. Product Description

MDF is defined under the ASTM International (ASTM) D1554-10 reference standard and under the Construction Specification Institute (CSI) Masterformat for common applications such as sheathing (06 16 00), millwork (06 22 00), interior architectural millwork (06 40 23), and wood trim (06 46 00). It can be manufactured in a variety of grades, dimensions, and panel sizes. This product line is sold under the trademark names Medite®, Medite® II, Medex®, Medite® FR, Arreis®, Medite® II 3D, Medite® 3D, Arreis® Ultra, and Medite® Lite. See Figure 1 for a flow diagram of the production process.

The wood used in the manufacturing of composite wood panels like MDF are the by-products of sawmills and other wood manufacturing facilities nearby, and therefore typically reflect the predominant species in a particular geographic region. Douglas-fir is abundant in the Pacific Northwestern U.S.

1.3. Product Average

The 2018 production data used in this EPD considers all MDF produced during the year.

1.4. Application

Applications for MDF include; cabinetry, furniture, shelving, casework, wall panels, moulding, millwork, elevator panels, thermally-fused laminate panels, and core for hardwood plywood panels.

1.5. Material Composition

Table 1 provides the average material content for MDF produced by Roseburg. This product meets the EPA Formaldehyde Emissions Regulation TSCA Title VI.

Table 1: MDF material content

COMPONENT	MASS [%, OVEN DRY BASIS]
Wood residue	95%
Isocyanate resin	3.4%
Borate flame retardant	0.88%
Urea	0.35%
Slack wax	0.29%

1.6. Technical Requirements

Roseburg MDF made in Medford, OR is an engineered panel, manufactured to specific standards as described in the ANSI A208.2 MDF standard. Physical and mechanical properties of panels are tested in accordance with ASTM D 1037, "Standard Test Methods for Evaluating the Properties of Wood-Based Fiber and Particle Panel Materials." Specific panel properties for Roseburg MDF products are available by product brand at





www.roseburg.com/ProductGroup/roseburg-mdf.

1.7. Properties of Declared Product as Delivered

The production data used in this EPD is presented in cubic meters, but includes the following possible dimensions:

- Lengths: 6', 8', 9', 10', 12', 14', 16'
- Widths: 4', 5'
- Thicknesses: 1/4" to 1-1/2"

Specific panel properties for Roseburg MDF products are available by product brand at www.roseburg.com/ProductGroup/roseburg-mdf.

2. Methodological Framework

2.1. Declared Unit

Per the product category rules, the functional unit for this analysis is 1 m³ of MDF.

Table 2: Declared Unit Properties

NAME	MDF	UNIT
Declared unit	1	m ³
Mass	753	kg
Thickness to achieve declared unit	n/a	
Density	753	kg/m ³
Moisture content	5	%

2.2. System Boundary

A cradle-to-gate system boundary was used for the analysis. Within these boundaries the following stages were included:

- Product stage: modules A1 to A3

Each module includes provision of all relevant materials, products and energy. Impacts and aspects related to wastage (i.e. production waste processing) are included. Installation, building operational energy and water use, and end-of-life are considered outside of this study's scope.

Capital goods and infrastructure flows are assumed to not significantly affect LCA results or conclusions and thus excluded from the analysis according to the cut-off rules.

2.3. Allocation

Allocation of manufacturing material and energy inputs was done on a mass-basis. Allocation of transportation was based on mass while taking into account the utilization rate.



2.4. Cut-off Rules

The procedure detailed in ISO 21930:2017 Section 7.1.8 must be followed for the exclusion of any inputs or outputs. The PCR states:

Criteria for the exclusion of inputs and outputs (cut-off rules) in the Life Cycle Assessment and information modules and any additional information are intended to support an efficient calculation procedure. They shall not be applied in order to hide data. Any application of the criteria for the exclusion of inputs and outputs shall be documented.

No cut-off criteria had to be applied for this study, as the system boundary was defined based on relevance to the goal of the study. For the processes within the system boundary, all available energy and material flow data have been included in the model. In cases where no matching life cycle inventories are available to represent a flow, proxy data have been applied based on conservative assumptions regarding environmental impacts.

2.5. Data Sources

The LCA model was created using the GaBi ts Software system for life cycle engineering, developed by thinkstep AG (thinkstep, 2019). Background life cycle inventory data for raw materials and processes were obtained from the GaBi 2019 database (service pack 38). Primary manufacturing data were provided by Roseburg.

2.6. Data Quality

A variety of tests and checks were performed throughout the project to ensure high quality of the completed LCA. Checks included a review of project-specific LCA models as well as the background data used.

Geographical Coverage

In order to satisfy cut-off criteria, proxy datasets were used as needed for raw material inputs to address lack of data for a specific material or for a specific geographical region. These proxy datasets were chosen for their representativeness of the actual product. Additionally, European data or global data were used when North American data (for raw materials sourced in the US) were not available.

Temporal Coverage

Foreground data is from 2018. The majority of background datasets are based on data from the last 3 years (since 2016).

Technological Coverage

The primary data represent production of the product under evaluation. Secondary data were chosen to be specific to the technologies in question (or appropriate proxy data used where necessary).

Completeness

Foreground processes were checked for mass balance and completeness of the emissions inventory. No data were knowingly omitted.

2.7. Period under Review

This analysis is intended to represent production in 2018.

2.8. Treatment of Biogenic Carbon

Per the PCR and ISO 21930, the uptake and emissions of carbon dioxide are separately reported for increased

transparency. Global warming potential is reported excluding biogenic carbon.

2.9. Comparability

No comparisons or benchmarking is included in this EPD. LCA results across EPDs can be calculated with different background databases, modeling assumptions, geographic scope and time periods, all of which are valid and acceptable according to the Product Category Rules (PCR) and ISO standards. Caution should be used when attempting to compare EPD results.

2.10. Estimates and Assumptions

The AWC softwood lumber EPD data, supplied by CORRIM, were used to model the wood residue impacts (American and Canadian Wood Councils, 2013). As any wood residue produced during manufacturing of softwood lumber was allocated by mass, this is an acceptable assumption.

3. Technical Information and Scenarios

3.1. Manufacturing

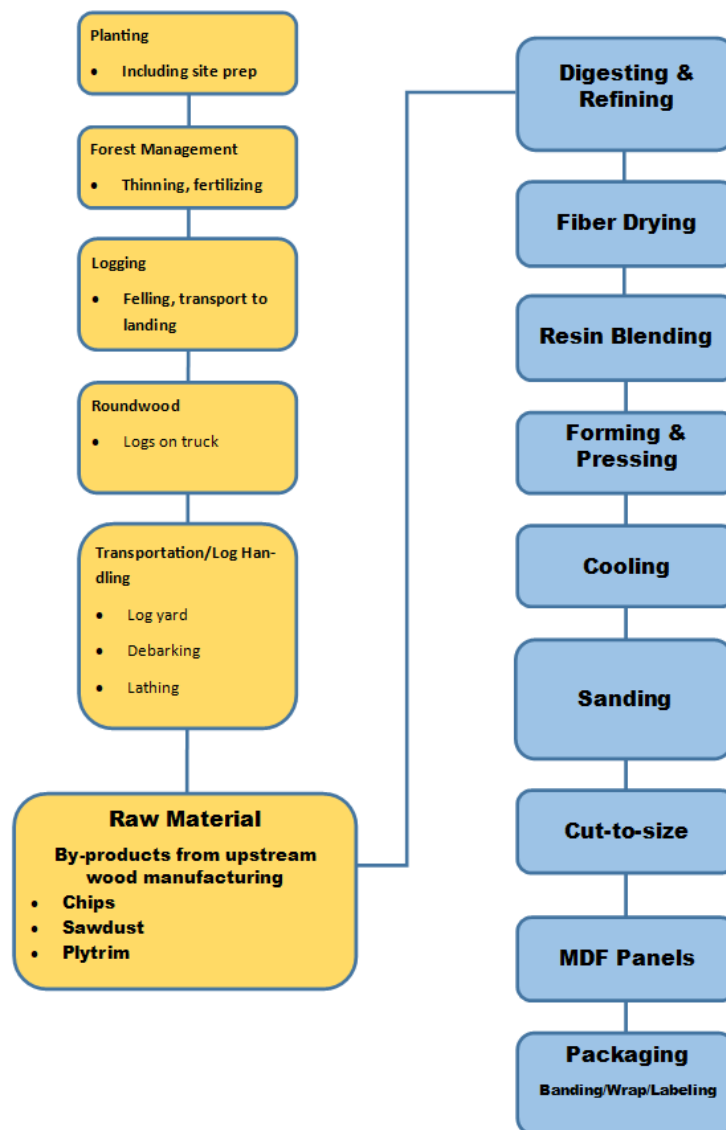
Wood residues are generated as a co-product in the milling of lumber, and generated as sawdust and wood waste in the fabrication of wood products. These wood residues are refined and fiberized to then be blended with resins, catalysts, and other additives, then pressed, cooled, sanded and trimmed. Finally, the product is packaged for shipping. The result is a very dense, homogenous panel that allows for detailed machining and profiling. All of these processes require electricity, fuels, and wood inputs as biomass fuel (see flow diagram in Figure 1).

3.2. Packaging

MDF is typically packaged using a combination of MDF bolsters, plastic or steel strapping, and cardboard / corrugate.

3.3. Transportation

Average transportation distances via truck and rail are included for the transport of the raw materials to production facilities.



3.4. Product Installation

Installation is not included in the scope of this study.

Figure 1: Flow chart for MDF production

3.5. Use

Use is not included in the scope of this study.

3.6. Reference Service Life and Estimated Building Service Life

Reference service life is not applicable, as use is not included in the scope of this study.

3.7. Reuse, Recycling, and Energy Recovery

End-of-life is not included in the scope of this study.

3.8. Disposal

End-of-life is not included in the scope of this study.

4. Environmental Indicators Derived from LCA

Table 3. Description of the system boundary modules. X = included in EPD scope; MND = module not declared (i.e., excluded from EPD scope)

	PRODUCT STAGE			CONSTRUCT- ION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
	Raw material supply	Transport	Manufacturing	Transport from gate to site	Assembly/Inst all	Use	Maintenance	Repair	Replacement	Refurbishment	Building Operational Energy Use During	Building Operational Water Use During	Deconstruction	Transport	Waste processing	Disposal	Reuse, Recovery, Recycling Potential
EPD Type	X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	X

Impact assessment and other results are shown for a cradle-to-gate system boundary. Module D accounts for energy recovered from landfill gas generated due to the disposal of production waste.

Table 4. North American Impact Assessment Results: MDF

TRACI v2.1	A1-A3	D
Global warming potential, GWP 100 [kg CO ₂ eq]	608	-1.16
Ozone depletion potential, ODP [kg CFC-11 eq]	7.74E-08	8.43E-14
Acidification potential, AP [kg SO ₂ eq]	3.00	-0.00176

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Eutrophication potential, EP [kg N eq]	0.242	-1.41E-04
Smog formation potential, SFP [kg O ₃ eq]	59.5	-0.0317
Abiotic depletion potential (fossil), ADP _{fossil} [MJ, surplus]	1,060	-1.44

Table 5. Resource Use: MDF

PARAMETER	A1-A3	D
Renewable primary resources used as energy carrier (fuel) RPR _E [MJ, LHV]	11,500	-8.02
Renewable primary resources with energy content used as material, RPR _M [MJ, LHV]	-	-
Non-renewable primary resources used as energy carrier (fuel), NRPR _E [MJ, LHV]	9,690	-16.4
Non-renewable primary resources with energy content used as material, NRPR _M [MJ, LHV]	833	-
Secondary materials, SM [kg]	841	-
Renewable secondary fuels, RSF [MJ, LHV]	2,090	-
Non-renewable secondary fuels, NRSF [MJ, LHV]	-	-
Recovered energy, RE [MJ, LHV]	-	-
Fresh water, FW [m ³]	7.88	-0.0280

Table 6. Output Flows and Waste Categories: MDF

PARAMETER	A1-A3	D
Hazardous waste disposed, HWD [kg]	6.45E-05	-9.93E-09
Non-hazardous waste disposed, NHWD [kg]	21.7	-0.00597
High-level radioactive waste, HLRW [kg]	0.119	-4.03E-04
Intermediate- & low-level radioactive waste, ILLRW [kg]	0.00404	-1.36E-05
Components for reuse, CRU [kg]	-	-
Materials for recycling, MR [kg]	-	-
Materials for energy recovery, MER [kg]	-	-
Exported energy, electrical EEE [MJ, LHV]	8.63	-
Exported energy, thermal EET [MJ, LHV]	4.06	-

Table 7. Carbon Emissions and Removals [kg CO₂]: MDF

PARAMETER	A1-A3	D
Biogenic carbon removal from product (BCRP)	421	-
Biogenic carbon emission from product (BCEP)	-	-
Biogenic carbon removal from packaging (BCRK)	5.10	-
Biogenic carbon emission from packaging (BCEK)	-	-
Biogenic carbon emission from combustion of waste from renewable sources used in production processes (BCEW)	57.4	-
Calcination carbon emissions (CCE)	-	-
Carbonation carbon removals (CCR)	-	-



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Carbon emissions from combustion of waste from non-renewable sources used in production processes (CWNR)	-	-
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5. LCA Interpretation

Within manufacturing, production of the wood residue and resin materials are the biggest drivers of impact, followed by emissions associated with the facility’s electricity consumption. Direct emissions of NOx is a significant contributor for SFP as well.

While this EPD does not address landscape level forest management impacts, potential impacts may be addressed through requirements put forth in regional regulatory frameworks, ASTM 7612-15 guidance, and ISO 21930 Section 7.2.11 including notes therein. These documents, combined with this EPD, may provide a more complete picture of environmental and social performance of wood products.

While this EPD does not address all forest management activities that influence forest carbon, wildlife habitat, endangered species, and soil and water quality, these potential impacts may be addressed through other mechanisms such as regulatory frameworks and/or forest certification systems which, combined with this EPD, will give a more complete picture of environmental and social performance of wood products.

EPDs can complement but cannot replace tools and certifications that are designed to address environmental impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, etc.

National or regional life cycle averaged data for raw material extraction does not distinguish between extraction practices at specific sites and can greatly affect the resulting impacts.

Accuracy of Results: EPDs regularly rely on estimations of impacts; the level of accuracy in estimation of effect differs for any particular product line and reported impact when averaging data. Variability was not estimated as part of this EPD.

6. Additional Environmental Information

6.1. Environment and Health During Manufacturing

Roseburg has implemented an Environmental Management System (EMS) company-wide, including the Medford, OR MDF manufacturing facility.

6.2. Extraordinary Effects

Information pertaining to the classification of the substances used to manufacture any of Roseburg’s MDF products including composition information, first aid measures, fire fighting measures, accidental release measures, handling and storage, exposure controls/PPE, physical and chemical properties, stability and reactivity, toxicological information, ecological information, disposal considerations, transport information, and regulatory information are contained in the product Safety Data Sheet which is available to download from the Roseburg website at www.roseburg.com.





6.3. Environmental Activities and Certifications

Roseburg MDF products made in Medford, OR are all certified by Scientific Certification Systems for their recycled material content and all are available to be purchased with Forest Stewardship Council® (FSC®) certification.

All MDF products made at the Medford, OR facility meet the EPA Formaldehyde Emissions Regulation TSCA Title VI.

Product brands including Arreis, Medite II, Medite II 3D, Arreis Ultra, Medex, and Medite FR are approved by the State of California Air Resources Board as CARB NAF Exempt.

Medite FR is certified by Guardian Fire Testing Laboratories, Inc. as a Class A/1 certified product.

Additional information about all of these certifications can be accessed on Roseburg's website at www.roseburg.com

7. References

- American and Canadian Wood Councils. (2013, April 16). *Environmental Product Declaration: North American Softwood Lumber*. Retrieved from <https://www.awc.org/pdf/greenbuilding/epd/AWC-EPD-SoftwoodLumber-190328.pdf>
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- UL Environment. (2019). *Part B: Structural and Architectural Wood Products EPD Requirements UL 10010-9 v.1.0*.



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8. Contact Information

8.1. Study Commissioner



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