



Green Label Product
Panels for the Building, Decorating and
Furniture Industry
(TGL-41-R1-11)

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TGL-41-R1-11

Panels for the Building, Decorating and Furniture Industry

1 Background

Currently, there is a growing trend towards the use of wood pieces/plant fibers/fast-growing trees/small trees/trees from plantations as raw materials to manufacture panels for the building, decorating, and furniture industries. These panels are the response to those market demand as a replacement of timber extracted from the natural forest. Awareness needed to be raised among producers and consumers to ensure that this trend continued by stressing out the importance of natural resources and environmental conservation that are facing manmade challenges particularly climate change and environmental degradation. Therefore, it is important to promote competition among panel manufacturers so that further technology and innovation will be developed, thus overall benefiting larger society.

The Green Label criteria for panels for the Building, Decorating, and Furniture Industry had been developed to promote sustainable forest management. In this way, this criterion could encourage people to reduce forest material consumption, utilize agricultural, plant, and manufacturing waste, and substitute forest materials with fast growing, small, and domesticated plants. Notably, the criterion uses life cycle assessment and considering human health and environmental condition.

2 Scope

This criterion covers to high density fiberboards (HDF), medium density fiberboards (MDF), particleboard, plywood, and heavy duty (HD) thermosetting laminate panels used in construction, decoration, and furniture industries including the panel that use laminated materials derived from thermosetting plastics, paper, and veneer.

3 Definitions

- 3.1 **High density fiberboard (HDF)** refers to the products made from wood fibers of lignocellulosic materials by heat pressing or heating so that the fiber of the wood adhered into a panel with or without the use of adhesives as a composition. The density of the product is more than 800 kilograms per cubic meter.
- 3.2 **Medium density fiberboard (MDF)** refers to products that are made from wood fibers or lignocellulosic materials by heat pressing or heating so that the fiber of the wood adhered into a panel with or without the use of adhesives as composition. The density of the product is between 400-800 kilograms per cubic meter.
- 3.3 **Flat pressed particleboard** refers to a particleboard product made from wood pieces or lignocellulosic materials by heat press machine with adhesives to seize the material. The heat press direction is perpendicular to the board. The board can either be characterized

by one layer, three layers, or more, or arranged by tiers. The density of the board is in between 400 to 900 kilogram per cubic meter.

- 3.4 **Extruded particleboard** refers to particleboard product manufactured from wood pieces or lignocellulosic materials attached together by glue or adhesives and heated through extrusion process. Wood pieces are laid down perpendicularly to extruding machine and later covered with wooded board. There are two types of extruded particle board: solid and tubular. The tubular particleboard has tubular-shaped spaces parallel to each other on the surface along the board's length. The density of the board is in between 350 to 800 kilogram per cubic meter.
- 3.5 **Plywood** refers to a product made from adhering several thin veneers (plies) of wood together. Plywood is characterized by more than 3 layers of veneer. The binded sides have wood grains in perpendicular position to each other, which helps strengthening the binding and minimize expansion and shrinkages.
- 3.6 **Thermosetting laminated panel** refers to a product made from fibrous sheets, such as paper that coated with thermosetting resin, laying down on top of each other and binding them with heat and pressure of no less than 5 megapascal. The outer layer is colored or decorated with patterns on one side or on both sides, which are divided into three types including heavy duty (HD), horizontal general purpose, and vertical light duty.
- 3.7 **Plastics laminated plywood for concrete formwork** refers to a product made from plywood laminated with plastics on one side or on both sides, which are typically used for concrete formwork.
- 3.8 **Synthetic resin adhesive** refers to the glue or resin derived from either phenolic resin or amino plastic resin or both in combination.
- 3.9 **Lignocelluloses material** refers to materials composed mainly of cellulose and lignin such as wood and various plants (bagasse, hemp, or jute).
- 3.10 **Veneer** refers to thin slices of wood through peeling or slicing of blocks of wood.
- 3.11 **Post-consumer material** refers to raw materials or finished product that had been already used its previous intended purpose, and had later been transformed or recovered for re-use purposes.
- 3.12 **Pre-consumer material** refers to raw materials that are left over from manufacturing or processing such as scraps or residues from cutting and decorating.
- 3.13 **Recovered material** refers to reprocessed or restored waste materials or by-products occurred during manufacturing process. This term does not include materials or by products processed from recycling or reuse materials as well as materials that can be fed back into the same manufacturing line.

- 3.14 **Paper** refers to paper with printed patterns such as wood patterns or simply plain color. Its weight is in between 40 to 140 gram per square meter. Its surface could be laminated with wax for moisture protection and gloss enhancement. During the lamination process, the paper is pressed against the board. It is ready to use when the resins dried, or resins can be quickly solidified with heat press. This paper is called foil or foil paper.
- 3.15 **Melamine laminated paper** refers to paper with printed pattern or simply plain color. This paper is laminated with melamine formaldehyde (MF) on its surface. During lamination processing, melamine resins solidified by heat on the paper surface. Melamine will be solidified completely for the second time during lamination process. Therefore, this type of paper could also be called low pressure melamine (LPF).
- 3.16 **Volatile organic compounds (VOCs)** refer to hydrocarbon compounds; or liquid organic compounds; or solid organic compounds that can be evaporated at 110 ± 5 °C at normal pressure.
- 3.17 **Total volatile organic compounds (TVOCs)** refer to the total amount of VOCs that can be separated by dissolving process in n-hexane and n-hexadecane by gas chromatography (GC). TVOC concentration is mainly estimated based on a toluene response factor.

4 General requirements

- 4.1 The product shall be certified or passed the relevant product specification tests by Thai Industrial Standard for each product as shown in Table 1 or international standards or recognized national standards.

Table 1 The relevant Thai Industrial Standard

No.	TIS Codes	Thai Industrial Standards
1	TIS 966	Medium Density Fiberboards (MDF)
2	TIS 876	Flat pressed particleboards
3	TIS 877	Extruded particleboards
4	TIS 178	Veneer plywood
5	TIS 1163	Thermosetting laminated sheets
6	TIS 1107	Plastics laminated plywood for concrete formwork

Verification method

The applicant shall submit the license to display industrial standard mark or test results according to the specified requirements in the industrial standard related to the product, or certificate or test results according to international standards (such as EN) or national standards (such as JIS).

- 4.2 Manufacturing, transportation and post-industrial waste disposal shall comply with the national laws and regulations.

Verification method

The applicant shall submit the documents or evidence to prove that the process of production, disposal and transportation of waste follow the laws and regulations of the government.

5 Environmental requirements

- 5.1 The product shall meet one of the following criteria:

- 5.1.1 The product shall be made of wood, pieces of wood, or wood fibers from certified tree plantations according to government regulations or the manufacturer shall be accredited by The Forest Stewardship Council (FSC).
- 5.1.2 The product shall be made of lignocellulose residuals from agricultural, community, or industrial wastes.

Verification method

The applicant shall submit one of the following evidences:

1. The reliable documents stating the origin of wood harvested from certified planted forests according to government regulations including a copy of legal ownership of land certificate or a copy of verification certificate of agriculturist under replanting program or a certified document issued by wood supplier or the certification of FSC. The certified document shall be stamped with the company hallmark and signed by authorized personnel of the manufacturer.
2. The reliable documents stating the origin of lignocellulose residuals from agricultural, community, or industrial wastes. They can be manufacturing report or the quantity of lignocellulose residuals or the receipt of lignocellulose residuals. The document shall be signed by authorized personnel of the origin of lignocellulose residuals.

- 5.2 Water consumption during production process shall not exceed 50 cubic meters per ton (product) for fresh water that feeds into production process.

Verification method

The applicant shall submit evidence to show the consumption fresh water that feeds into production process. The document shall be signed by authorized personnel of the manufacturer.

5.3 Controlled amount of chemical substances in the product (bare wood).

5.3.1 Acceptable limit of heavy metals are as follows:

Chromium (IV)	≤ 60 mg/kg
Cadmium	≤ 75 mg/kg
Lead	≤ 60 mg/kg
Mercury	≤ 90 mg/kg
Arsenic	≤ 25 mg/kg
Antimony	≤ 60 mg/kg
Selenium	≤ 500 mg/kg
Barium	≤ 1,000 mg/kg

Verification method

The applicant shall submit the test reports on the heavy metals' contamination in the respective product according to the test method specified in EN 71 Part 3 or international standards or equivalent national standards.

5.3.2 Pentachlorophenol shall not exist in the product (in case of contamination from other material sources, only less than 5 mg/kg is permitted).

Verification method

The applicant shall submit the test reports for pentachlorophenol according to the test method specified in EN 71 standards Part 11 or international standards or recognized national standards.

5.3.3 The quantity of formaldehyde is controlled as follows:

5.3.3.1 Formaldehyde presence in the wood shall not exceed 8 mg/100 g of dry pressed panel or

5.3.3.2 Formaldehyde emission from dry pressed panel shall not exceed 1.5 mg/L.

Verification method

The applicant shall submit the test reports for the amount of formaldehyde in the wood according to test methods specified in EN 120 or test results of formaldehyde emission from wood panel according to methods specified in JIS A 1460 or international standards or equivalent national standards.

5.3.4 TVOC_s emission rate (24 hrs) shall not exceed 0.25 mg/m³ hr.

Verification method

The applicant shall submit the test reports for TVOC_s emission rate according to the test method specified in ASTM D 5116 or international standards or equivalent national standards.

5.4 Lamination material

5.4.1 Melamine paper

- 1) Melamine paper shall not compose the substances listed in Annex 1 of Directive 67/548/EEC.

Verification method

The applicant shall submit letter of declaration for compliance that melamine paper used for the product does not compose the substances listed in Annex 1 of Directive 67/548/EEC. The document shall be signed by authorized personnel of the melamine paper manufacturer.

- 2) Melamine paper used shall not be composed of these flame retardants: polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE).

Verification method

The applicant shall submit letter of declaration for compliance that melamine paper used for the product does not compose flame retardants including polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE). The document shall be signed by authorized personnel of the melamine paper manufacturer.

- 3) Lamination materials are permitted to have the concentrations of phthalate as follows:
 - The total concentrations of bis (2-ethylhexyl) phthalate (DEHP), dibutyl phthalate (DBP) and benzyl butyl phthalate (BBP) shall not exceed 0.1% by weight of plasticizers (1,000 mg/kg)
 - The total concentrations of di-isononyl phthalate (DINP), di-isodecyl phthalate (DIDP) and di-n-octyl phthalate (DNOP) shall not exceed 0.1% by weight of plasticizers (1,000 mg/kg).

Verification method

The applicant shall submit the test reports for phthalate concentrations according to the test method specified in EN 14372 or CPSC-CH-C-1001-09.03 or international standards or recognized national standards.

- 4) Paints used with melamine paper are permitted to consist of heavy metal with the impurity and contamination as follows:

Cadmium	≤ 100 ppm (by weight)
Mercury	≤ 1,000 ppm (by weight)
Lead	≤ 1,000 ppm (by weight)
Hexavalent chromium	≤ 1,000 ppm (by weight)
Total concentrations of cadmium, mercury lead and hexavalent chromium	≤ 1,000 ppm (by weight)

Verification method

The applicant shall submit either of the following evidences;

1. Test reports for mercury, lead, cadmium and hexavalent chromium concentrations using test method as following;
 - 1.1 Lead concentration, test according to ISO 3856-1 or ASTM D 3335
 - 1.2 Cadmium concentration, test according to ISO 3856-4 or ASTM D 3335
 - 1.3 Hexavalent chromium concentration, test according to ISO 3856-5
 - 1.4 Mercury concentration, test according to ISO 3856-7 or ASTM D 3624
 - 1.5 Lead, cadmium, hexavalent chromium and mercury concentration, test according to IEC 62321 or international standards or recognized national standards.
2. A declaration letter issued by paint manufacturer together with test reports for mercury, lead, cadmium and hexavalent chromium concentrations, according to the test method specified in 1.1-1.5

In case of the applicant cannot submit a certified letter or test reports as specified above, the applicant must send a list of all colors used with lamination material, required by Green Label certification, to Green Label's officer for the color testing in order to find out heavy metals concentration in paints using specified test methods. All five color samples will be tested.

- Remarks:**
- 1) The five samples tested by Green Label's officer will be considered as representatives of all colors to be certified with Green Label for each application. In case of more colors are being used, the applicant must submit the application again and colors sampling will be conducted as part of the new application.
 - 2 All samples shall comply with the criteria. If one of the color samples does not pass the criteria, the paints used with lamination material will be considered inconsistent to this criterion.

5.4.2 Thermosetting laminated panel: horizontal general purpose (HG) and vertical light duty (VL)

- 1) The thermosetting laminated panel shall be certified to Thai Industrial Standard, TIS 1163 for thermosetting laminated sheets or pass the product quality specification tests under TIS 1163 or recognized national standards.

Verification method

The applicant shall submitted the license to display industrial standard mark or test results according to the specified requirements in TIS 1163, or certificate or test results according to international standards (such as EN) or national standards (such as JIS).

- 2) Paints used with thermosetting laminated panel are permitted to have concentrations of heavy metal due to impurity and contamination as follows:

Cadmium	≤ 100 ppm (by weight)
Mercury	$\leq 1,000$ ppm (by weight)
Lead	$\leq 1,000$ ppm (by weight)
Hexavalent chromium	$\leq 1,000$ ppm (by weight)
Total concentrations of cadmium, mercury lead and hexavalent chromium	$\leq 1,000$ ppm (by weight)

Verification method

The applicant shall submit either of the following evidences;

1. Test reports for mercury, lead, cadmium and hexavalent chromium concentrations using test method as following;
 - 1.1 Lead concentration, test according to ISO 3856-1 or ASTM D 3335
 - 1.2 Cadmium concentration, test according to ISO 3856-4 or ASTM D 3335
 - 1.3 Hexavalent chromium concentration, test according to ISO 3856-5
 - 1.4 Mercury concentration, test according to ISO 3856-7 or ASTM D 3624
 - 1.5 Lead, cadmium, hexavalent chromium and mercury concentration, test according to IEC 62321 or international standards or recognized national standards.
2. A declaration letter issued by paint manufacturer together with test reports for mercury, lead, cadmium and hexavalent chromium concentrations, according to the test method specified in 1.1-1.5

In case of the applicant cannot submit a certified letter or test reports as specified above, the applicant must send a list of all colors used with lamination material, required by Green Label certification, to Green Label's officer for the color testing in order to find out heavy metals concentration in paints using specified test methods. All five color samples will be tested.

Remarks: 1) The five samples tested by Green Label's officer will be considered as representatives of all colors to be certified with Green Label for each application. In case of more colors are being used, the applicant must submit the application again and colors sampling will be conducted as part of the new

application.

- 2 All samples shall comply with the criteria. If one of the color samples does not pass the criteria, the paints used with lamination material will be considered inconsistent to this criterion.

- 3) Thermosetting laminated panel are permitted to have the concentrations of phthalate as follows:

- The total concentrations of bis (2-ethylhexyl) phthalate (DEHP), dibutyl phthalate (DBP) and benzyl butyl phthalate (BBP) shall not exceed 0.1% by weight of plasticizers (1,000 mg/kg)
- The total concentrations of di-isononyl phthalate (DINP), di-isodecyl phthalate (DIDP) and di-n-octyl phthalate (DNOP) shall not exceed 0.1% by weight of plasticizers (1,000 mg/kg).

Verification method

The applicant shall submit the test reports for phthalate concentrations according to the test method specified in EN 14372 or CPSC-CH-C-1001-09.03 or international standards or recognized national standards.

- 4) Thermosetting laminated panel used shall not compose of these flame retardants: polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE).

Verification method

The applicant shall submit letter of declaration stating that thermosetting laminated panel in the product does not compose of flame retardants include polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE). The document shall be signed by authorized personnel of the thermosetting laminated panel manufacturer.

5.4.3 Paper

- 1) Due to impurity and contamination concerns, paints used with paper are permitted to have the concentrations of heavy metal as follows:

Cadmium	≤ 100 ppm (by weight)
Mercury	≤ 1,000 ppm (by weight)
Lead	≤ 1,000 ppm (by weight)
Hexavalent chromium	≤ 1,000 ppm (by weight)
Total concentrations of cadmium, mercury lead and hexavalent chromium	≤ 1,000 ppm (by weight)

Verification method

The applicant shall submit either of the following evidences;

1. Test reports for mercury, lead, cadmium and hexavalent chromium concentrations using test method as following;
 - 1.1 Lead concentration, test according to ISO 3856-1 or ASTM D 3335
 - 1.2 Cadmium concentration, test according to ISO 3856-4 or ASTM D 3335
 - 1.3 Hexavalent chromium concentration, test according to ISO 3856-5
 - 1.4 Mercury concentration, test according to ISO 3856-7 or ASTM D 3624
 - 1.5 Lead, cadmium, hexavalent chromium and mercury concentration, test according to IEC 62321 or international standards or recognized national standards.
2. A declaration letter issued by paint manufacturer together with test reports for mercury, lead, cadmium and hexavalent chromium concentrations, according to the test method specified in 1.1-1.5

In case of the applicant cannot submit a certified letter or test reports as specified above, the applicant must submit a list of all colors used with lamination material, required by Green Label certification, to Green Label's officer to be tested for heavy metals concentration in paints by specified test methods. All five color samples used in laminating materials will be tested.

Remarks: 1) The five samples are considered as representatives of all colors to be certified by Green Label for each application. In case of more colors are being used, the applicant must submit the application again and colors sampling will be conducted as part of the new application.

2) Test report of five color samples shall be all complied by the criteria. If only one out of all color samples does not meet the criteria, the paints used with paper will be considered inappropriate by this criterion.

2) Paper are permitted to have concentrations of phthalate due to contamination as follows:

- The total concentrations of bis (2-ethylhexyl) phthalate (DEHP), dibutyl phthalate (DBP) and benzyl butyl phthalate (BBP) shall not exceed 0.1% of plasticizers weight (1,000 mg/kg)
- The total concentrations of di-isononyl phthalate (DINP), di-isodecyl phthalate (DIDP) and di-n-octyl phthalate (DNOP) shall not exceed 0.1% of plasticizers (1,000 mg/kg).

Verification method

The applicant shall submit the test reports for phthalate concentrations according to the test method specified in EN 14372 or CPSC-CH-C-1001-09.03 or international standards or recognized national standards.

5.4.4 Veneer

- 1) The veneer shall be made of wood, pieces of wood, or wood fibers from certified tree plantations according to government regulations or the manufacturer shall be accredited by The Forest Stewardship Council (FSC).

Verification method

The applicant shall submit the reliable documents stating the origin of wood whether it was harvested from a certified planted forests according to government regulations include a copy of legal ownership of land certificate or a copy of verification certificate of agronomist under forest program or a certified document issued by wood supplier or the certification of FSC. The certified document shall be stamped with the company hallmark and signed by authorized personnel of the manufacturer.

- 2) Paints used with the veneer are permitted to have concentrations of heavy metal due to impurity and contamination as follows:

Cadmium	≤ 100 ppm (by weight)
Mercury	$\leq 1,000$ ppm (by weight)
Lead	$\leq 1,000$ ppm (by weight)
Hexavalent chromium	$\leq 1,000$ ppm (by weight)
Total concentrations of cadmium, mercury lead and hexavalent chromium	$\leq 1,000$ ppm (by weight)

Verification method

The applicant shall submit either of the following evidences;

1. Test reports for mercury, lead, cadmium and hexavalent chromium concentrations using test method as following;
 - 1.1 Lead concentration, test according to ISO 3856-1 or ASTM D 3335
 - 1.2 Cadmium concentration, test according to ISO 3856-4 or ASTM D 3335
 - 1.3 Hexavalent chromium concentration, test according to ISO 3856-5
 - 1.4 Mercury concentration, test according to ISO 3856-7 or ASTM D 3624
 - 1.5 Lead, cadmium, hexavalent chromium and mercury concentration, test according to IEC 62321 or international standards or recognized national standards.
2. A declaration letter issued by paint manufacturer together with test reports for mercury, lead, cadmium and hexavalent chromium concentrations, according to the test method

specified in 1.1-1.5

In case of the applicant cannot submit a certified letter or test reports as specified above, the applicant must send a list of all colors used with lamination material, required by Green Label certification, to Green Label's officer to be tested for heavy metals concentration in paints by specified test methods. All five samples will be tested.

Remarks: 1) The five samples are considered as representatives of all colors to be certified by Green Label for each application. In case of more colors are being used, the applicant must submit the application again and colors sampling will be conducted as part of the new application.

2) Test report of five color samples shall be all complied by the criteria. If only one out of all color samples does not meet the criteria, the paints used with laminating material will be considered inappropriate by this criterion.

3) Due to contamination concern, the veneer are permitted to have phthalate concentrated as follows:

- The total concentrations of bis (2-ethylhexyl) phthalate (DEHP), dibutyl phthalate (DBP) and benzyl butyl phthalate (BBP) shall not exceed 0.1% of plasticizers weight (1,000 mg/kg)
- The total concentrations of di-isononyl phthalate (DINP), di-isodecyl phthalate (DIDP) and di-n-octyl phthalate (DNOP) shall not exceed 0.1% of plasticizers weight (1,000 mg/kg).

Verification method

The applicant shall submit the test reports for phthalate concentrations according to the test method specified in EN 14372 or CPSC-CH-C-1001-09.03 or international standards or recognized national standards.

5.5 Packaging

5.5.1 Due to impurity and contamination concern, inks, paints, pigments or additive used for printing on the packaging or labeling on the packaging are not permitted to have concentrations of mercury, lead, cadmium and hexavalent chromium exceeding 0.01% (100 mg/kg) of its dry weight.

Verification method

The applicant shall submit test reports for mercury, lead, cadmium and hexavalent chromium concentrations using test method as following;

- 1) Mercury concentration, test according to ISO 3856-7 or ASTM D 3624
- 2) Lead concentration, test according to ISO 3856-1 or ASTM D 3335
- 3) Cadmium concentration, test according to ISO 3856-4 or ASTM D 3335
- 4) Hexavalent chromium concentration, test according to ISO 3856-5

or international standards or recognized national standards.

5.5.2 Plastic packaging shall be symbolized according to Thai Industrial Standard, TIS 1310 for recycling plastics or be marked according to plastic symbols and abbreviated terms given in ISO 1043 or ISO 11469.

Verification method

The applicant shall submit a declaration letter indicating that the plastic packaging has been symbolized according to Thai Industrial Standard, TIS 1310 for recycling plastics or marked according to plastic symbols and abbreviated terms given in ISO 1043 or ISO 11469. The document shall be signed by authorized personnel of the packaging manufacturer.

6. Testing and certification

6.1 Testing

6.1.1 The laboratory shall be operated by the government or under governmental control as defined by clause 5 of the Industrial Standard Act B.E. 2511 (and its addenda) or certified by TIS 17025¹ or ISO 17025².

6.1.2 Test results

6.1.2.1 Test results shall comply with testing methods defined in this document.

6.1.2.2 If “comparable test methods” are submitted, the following documents shall be submitted with the test results:

- (1) Declaration letter from the laboratory verifying that the test methods are comparable to the methods defined in this document.
- (2) Method validation documents which enable unequivocal scientific verification that the testing methods and requirements defined in this document have been met.

6.1.2.3 Test results shall have been issued no more than 1 year following the application date.

6.2 Declaration letter to verify compliance with Green Label requirements

6.2.1 Shall have been issued no more than 1 year following the application date.

6.2.2 Shall be signed by the authorized directors and have the company seal affixed (if relevant).

¹TIS 17025 General Requirements for the Competence of Testing and Calibration Laboratories.

²ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories.