



UL 2826

Standard for Sustainability for Paperboard

Standard for Sustainability for Paperboard, UL 2826

First Edition, Dated March 25, 2013

Summary of Topics

This is the First Edition of the Standard for Sustainability for Paperboard, UL 2826

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INTRODUCTION

1 General

1.1 This Standard is designed to support a continuing effort to improve and/or maintain environmental quality by reducing energy and materials consumption and by minimizing the impacts of pollution generated by the production, use and disposal of goods and services.

1.2 Pulp and paper mills consume significant quantities of energy and resources and may release waterborne and airborne substances into the receiving environment and generate solid waste. Alternatives are available to manufacturers in the choice of pulp furnish and emission control to mitigate adverse environmental impacts.

1.3 This document was developed using a multi-parameter approach that identifies the most important environmental stressors from all stages of the product's life cycle. These environmental stressors have been translated into pulp and paper related criteria that will result in lower environmental impacts.

1.4 A requirement for a minimum content of recycled material is not specified in this document. This parameter has been incorporated into the calculation of resource consumption and solid waste production. Performance in these areas improves as the amount of recycled material increases.

1.5 Based on a review of currently available life cycle information, the product category requirements will produce an environmental benefit through reduction in air emissions; reduction in water emissions; reduction of waste; efficient use of fiber, preferably recycled fiber; and a reduction in energy use.

1.6 This Standard is a republication of EcoLogo Certification Criteria Document, CCD 076, Paperboard. The criteria have been reformatted for consistency with the Style Manual for UL Standards.

2 Scope

2.1 This Standard covers all paperboard.

3 Units of Measurement

3.1 For the purposes of these requirements, values shall be reported in accordance with the requirements of the specific criteria and shall be in metric units. If a manufacturer's choice of units deviates, that change shall be documented and justified as to the reason and relevance for that change.

4 Undated References

4.1 Any undated reference to a code or standard appearing in the criteria of these requirements shall be interpreted as referring to the latest edition of that code or standard. The exception shall be in the case where the criterion explicitly states a certain version or date to be used.

5 Glossary

5.1 For the purpose of these requirements, the following definitions apply.

5.1.1 **ACIDIFICATION POTENTIAL** – A measure of the impact of emissions on acid rain formation. It is calculated using atmospheric emissions of sulphur dioxide (SO₂) and nitrogen oxide (NO_x) compounds. For purposes of this document, acidification potential is based on measured SO₂ emissions from the mill.

5.2 **AGRICULTURAL FIBER** – A solid residue arising from the harvesting and processing of agricultural crops (e.g. dried stalks of harvested grain) that would otherwise be incinerated or sent to landfill.

5.3 **BIOMASS** – Biological materials (e.g., hogfuel, black liquor organics) that are commonly used as an energy source; (Canadian Standards Association, final draft CAN/CSA-Z810-96, 1996).

5.4 **CHEMICAL OXYGEN DEMAND (COD)** – A measure of the amount of oxygen required to oxidize organic and oxidizable inorganic compounds in water. It measures the fraction of organic substances present in mill effluent that the natural environment cannot readily degrade. COD is measured by ISO 6060 test method, or method 5220 C or D in "Standard Methods for the Examination of Water and Wastewater", 17th Ed., American Public Health Association, American Water Works Association and Water Pollution Control Federation, 1989, Washington, DC.

5.5 **CODE OF SUSTAINABLE FOREST PRACTICES** – A statement of practices which has the objective of maintaining environmental, economic, and social values of the forest. A code must specify, at a minimum, harvesting practices, forest regeneration, biodiversity and wildlife protection, soil conservation, watershed protection, and the participation of communities in forest planning. A code could be included in certification under FSC, ISO 14001 or CAN/CSA Z809, ISO 14001, or could be an adaptation of the forestry indicators from the Canadian Council of Forest Ministers, the Montreal Process and/or the Helsinki Process.

5.6 **COGENERATION** – Generating electrical energy for production and using the waste heat in the form of steam from the generation in other areas of the manufacturing process. Cogeneration requires approximately one third of the fuel that is required by condensing power

5.7 **CONSUMER** – A household, commercial establishment or institutional facility.

5.8 **DRY BROKE** – Paper such as that spoiled in the process of drying, calendering, winding, rewinding and trimming, including butt rolls.

5.9 **EFFLUENT** – Waste water from a mill, including process water, gas scrubbing water, boiler blowdown water, washdown water, cooling water and leachate from any site at the mill where solid residues generated by any mill are treated or disposed of or where wood chips or hogfuel is stored.

5.10 **FIBER-ONLY** – The actual amount of fiber that is fed into the pulp digester with a 10% moisture content less the mass of any additives.

5.11 GLOBAL WARMING POTENTIAL (GWP) – The time-integrated change in radiative forcing due to the instantaneous release of 1 kilogram of a gas expressed relative to the radiative forcing from the release of 1 kilogram of CO₂.

5.12 HELSINKI PROCESS – The Pan-European Criteria and Indicators for Sustainable Forest Management.

5.13 IC₂₅ – Inhibiting concentration that will affect 25% of the test organisms.

5.14 INCINERATION WITHOUT ENERGY RECOVERY – The combustion of a solid, liquid or gaseous waste with no power or chemical recovery.

5.15 ISO – The International Organization for Standardization.

5.16 LANDFILLED – A method of disposing of solid mill waste by transporting it to a designated land area, dumping it into excavations and then applying a covering.

5.17 MARGINAL FUELS – Those fuels used by utilities to fulfill any marginal or incremental power demands. Many utilities supplying electricity to the grid do so by keeping either hydroelectric and/or nuclear facilities operating at the maximum required rate. When electricity requirements change or incrementally increase, the marginal change in power generation supplied by the utility is generally done with fossil fuels (i.e. oil, coal).

5.18 MARKET PULP – The pulp that is sold to paper producers on the open market.

5.19 MEASURABLE CONCENTRATION OF 2,3,7,8-TCDD – A concentration of 2,3,7,8-TCDD that is greater than the level of quantification (10 ppq) when tested using one of the following methods:

a) Method 1613 Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution HRGC/HRMS in "Guidelines Establishing Test Procedures for the Analysis of Pollutants"; US Environmental Protection Agency, October 1994; or

b) Report EPS 1/RM/19, "Reference Method for the Determination of Polychlorinated Dibenzopara- dioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) in Pulp Mill Effluents", Environment Canada, 1991.

5.20 MEASURABLE CONCENTRATION OF 2,3,7,8-TCDF – A concentration of 2,3,7,8-TCDF that is greater than the level of quantification (10 ppq) and that when multiplied by 0.1, exceeds 5 ppb, when tested using one of the following methods:

a) Method 1613 Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution HRGC/HRMS in "Guidelines Establishing Test Procedures for the Analysis of Pollutants"; US Environmental Protection Agency, October 1994; or

b) Report EPS 1/RM/19, "Reference Method for the Determination of Polychlorinated Dibenzopara- dioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) in Pulp Mill Effluents", Environment Canada, 1991.

5.21 MONTREAL PROCESS – The Working Group on Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests.

5.22 NON-WOOD FIBER – The alternative fiber sources and includes, but is not limited to, hemp, cotton, bamboo, straw, other plants cultivated specifically for use as a fiber source, and agricultural wastes.

5.23 OVER THE FENCE – The chemicals that are produced on-site, but where chemical and electricity metering is performed by the chemical supplier or organization that “leases” the equipment to the mill.

5.24 POST-CONSUMER MATERIAL – A product that has served its end-use at the consumer level, has been discarded by the consumer, and would, unless diverted, enter the waste stream.

5.25 PRE-CONSUMER MATERIAL – Materials generated by an industrial process that would, unless diverted, enter the waste stream. This includes, but is not limited to, damaged or defective materials, overstock or obsolete inventories from manufacturers, distributors, wholesalers and trimmings from converting processes. It does not include wet or dry broke, except that proportion originating as preconsumer materials.

5.26 PRINTED RECOVERED MATERIAL – Material which has been printed and/or coated and would, unless diverted, enter the waste stream.

5.27 PRODUCT UNIT – A metric tonne of pulp or paper product that is produced.

5.28 PULP – Fibrous material produced mechanically or chemically by reducing woody plants into their component parts from which paper or paperboard sheets are formed.

5.29 RAW WOOD FIBER – The fiber from wood which has not previously been pulped (chips and roundwood).

5.30 RECOVERED FIBER – The fiber derived from planer shavings, sawdust, pre-consumer materials and post-consumer materials.

5.31 RECYCLED MATERIAL – Post-consumer material and pre-consumer material. It does not include by products of an industrial process that can be, and regularly are, used in either the same process, or in a different process, except that proportion which originated as post-consumer material and pre-consumer material. It may include sawdust or planer shavings from sawmill operations.

5.32 SUBLETHAL TOXICITY – The effects that a substance has on a test organism over a significant portion of the test organisms life (10% or more), such as growth, reproductive or metabolic inhibition.

5.33 TEF_{sub} – The sublethal toxicity emission factor. It is calculated as $TEF_{sub} = [\log (100/IC_{25\text{ mean}})] \times [\text{annual mill effluent flow in m}^3] \div [\text{annual mill tonnage in ADMT}]$. Toxicity shall be measured using two different species of divergent taxonomic and ecological ranks. These species should be physiologically and ecologically similar to organisms that reside in North American ecosystems. Listed below are acceptable methods.

Testing on an aquatic vertebrate species using one of the following:

- a) EPA-821-R02-012, “Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Estuarine and Marine Organisms” (Menidia beryllina), US Environmental Protection Agency, 2002; or

- b) EPA-600-R95-136, "Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms", US Environmental Protection Agency, 1995; or
- c) Report EPS 1/RM/22, "Biological Test Method: Test of Larval Growth and Survival Using Fathead Minnows", Environment Canada, 1992.

Testing on an aquatic invertebrates species using one of the following:

- a) EPA-821-R02-013, "Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" (*Ceriodaphnia dubia*), US Environmental Protection Agency, 2002; or
- b) EPA-600-R95-136, "Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms", US Environmental Protection Agency, 1995; or
- c) Report OECD/OCDE-211, "Daphnia magna Reproduction Test", Organization for Economic Cooperation and Development, September 1998; or.
- d) Report EPS 1/RM/2, "Biological Test Method: Test of Reproduction and Survival Using the Cladoceran *Ceriodaphnia dubia*", Environment Canada, 1992; and
- e) Report EPS 1/RM/27, "Biological Test Method: Fertilization Assay Using Echinoids (Sea Urchins and Sand Dollars)", Environment Canada, 1992.

5.34 WET BROKE – The paper recovered from the wet press of a paper machine.

APPENDIX A

A1 Load Point Determination

A1.1 Load Points are assigned for each parameter listed in Table 1 below on a linear scale from a minimum value of zero to a threshold value of four. Products that result in values exceeding the threshold on any parameter are assigned additional Load Points on an extrapolated linear scale. The Load Points for each parameter are summed to calculate the total Load Point value for the product. The data collection and calculation methodology provided in Appendix B must be done for each product that is to be certified. Appendix II will be provided on request to those who wish to calculate Load Points for a given product.

A1.2 Generally, the minimum end of the scale for a parameter corresponds to the best attained by any installation in the world with a proven record of operating commercially and reliably. A manufacturing process that generates a parameter equal to the minimum end of the scale would be assigned zero points for the parameter. If innovative or unusual technology is used to operate below the minima stated herein, then negative points would be assigned. A threshold value, corresponding to approximately the 80th percentile of commercially operating values for the parameter, has been set and would correspond to 4 Load Points. Intermediate values have been scaled linearly.

A1.3 For example, a mill using 100% post-consumer fiber achieves a Load Point value of '0' for Resource Depletion because no primary fiber is used in the production of its pulp. The 80th percentile would be a mill using a mix of recycled content and other fiber sources that achieves a fiber-use efficiency of 1.3 tonnes input per tonne of pulp produced. This mill would receive a Load Point of '4'. Parameters above the threshold value would be assigned Load Points on the same linear scale. Values substantially above the threshold point would effectively disqualify a product. A product with one characteristic parameter that exceeds the threshold value would have to perform well in all other parameters to qualify.

Table A1
Calculating total load points

Category	Parameter	Units	Calculated Load Point (from Appendix II)
Resource depletion	Fiber Use	tonnes / ADMT product	
Liquid effluent	Chemical Oxygen Demand	kg / ADMT product	
Liquid effluent	Sublethal Toxicity	TEF _{sub}	
Energy consumption	Energy Use	GJ / ADMT product	
Global warming	Global Warming Potential Measure (estimated CO ₂ emissions)	GJ / ADMT product	
Acidification	Acidification Potential Measure (Estimated SO ₂ emissions)	kg SO ₂ / ADMT product	
Solid waste	Solid Waste	m ₃ / ADMT product	
Total Calculated Load Points			

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APPENDIX B¹

B1 Method for Load Point Determination

¹ The Material in this Appendix is based on: Forest Products Associate of Canada, *Environmental Profile Data Sheet Users' Guide*, 1977.

INTRODUCTION

This Appendix provides an outline of the methodology to be used by a mill when calculating the Load Points shown in the table of Appendix A in this Standard. The seven measures to be determined are Fibre-use Efficiency, Chemical Oxygen Demand, Energy Use, Global Warming Potential Measure, Acidification Potential Measure, Solid Waste and Sublethal Toxicity. The first six of these are to be carried out on the basis of one air-dry metric tonne (ADMT) of each product that is being certified. Calculations for Sub-Lethal Toxicity are carried out on a mill basis.

Collecting Data

For the purposes of this Appendix, the data collected must represent one consecutive 12-month period of production, and *all* data must be taken from this same 12-month period. The starting date of this period can be no more than eighteen months old. Whatever twelve month period is chosen, it should be convenient from a data collection perspective (e.g. the most recent fiscal year, the 12-month period required for regulatory purposes). Note that most of the required data should be readily available from existing mill records.

Where multiple products are being manufactured at a single facility, the Measures would first have to be “allocated” to each product, prior to completing any required calculations. This “allocation process” must be based on a rationale that is justifiable and can be backed by experiential knowledge, mill records, surveys, test data, direct causal relationships or some other scientifically-based information.

Mill records may not singularly assign either material or energy flows to a product system. As each mill has a unique material and energy use profile, strict rules regarding how to allocate these flows to the product cannot be given. To ensure allocations are made in an appropriate and consistent manner, general allocation principles and procedures are provided below.

Allocation Principles²

²The allocation principles described here are consistent with:

- American Forest & Paper Association, Canadian Pulp and paper Association; *LCI User's Guide*; 1996; and
- International Organization for Standardization, Technical Committee 207, Subcommittee 5; Committee Draft 14041, *Environmental Management – Life Cycle Assessment – Inventory Analysis*, December 01, 1995.

The product system will probably not exist in isolation. It may include multiple processes and may share processes with other products. Allocation assumptions and procedures shall reflect this network of operations within the overall system. The relevant processes or linked systems must be identified, and only the relevant loadings (e.g. energy use) assigned to the product.

Extreme allocations, such as assigning all or none of the loading to the product, are generally not appropriate unless only one product is manufactured at the mill. Any such allocations must be completely justifiable and directly supported by data.

The inventory of all individual product loadings should equal the inventory for the total mill. A check should be made to see if this is the case. Since logistics and resources may not allow for a complete mass/energy balance, any deviations should be documented and justified.

Allocation factors (e.g. an energy or mass ratio) can be used to assign appropriate loadings to the product.

If several allocation approaches seem possible, a sensitivity analysis should be conducted on the results to see the consequences of choosing one approach over another. If the assumptions prove to be highly sensitive, the assumptions should be reviewed and possibly changed.

Allocation Principles³

³ The allocation procedures described here are consistent with those defined in American Forest & Paper Association's and Canadian Pulp and Paper Associations's *LCI User's Guide* dated 1996.

These procedures are listed in a preferred order of priority.

- a) Wherever possible, allocations should be minimized.
- b) Any allocation should reflect the underlying physical relationship that exists between system inputs and outputs. These physical relationships should reflect the manner in which inputs and outputs are altered by quantitative changes in the product (i.e. causal physical relationships).
- c) Direct causal relationships that are measurable by physical parameters should be used wherever possible (e.g. gasoline and diesel are used only for transportation, spent pulping liquor is used as an energy source for only one product at the mill, etc.).
- d) Where these physical causal relationships cannot be established as a basis for allocation, economic or market descriptors should be used. Other possible descriptors may include a mass balance using production tonnage or applying a ratio of non-black liquor generated steam to black liquor generated steam.

Keep the following points in mind when using any allocation procedures.

- a) There should be a uniform and consistent application of allocation procedures to inputs and outputs of the system. For example, if a particular fuel allocation is made when determining energy use, that same allocation shall be applied to other determinations, such as air emissions.
- b) All values should be allocated to the product according to clearly stated procedures and assumptions. The assumptions should be documented in sufficient detail or should have supporting data sources that are both justifiable and verifiable. Any unallocated portion shall also be fully justified and explained.
- c) In some instances in this Appendix, the allocation procedures are prescribed.

Sources of Off-Site Processed Pulp

If off-site processed pulp is used to manufacture the product to be certified, similar data from the off-site pulp mill must also be included in calculations for all of the measures except Fibre-use. The total value for the six measures will include both on-site mill data and data from each pulp source on a basis proportional to the quantity of pulp used in the product.

A separate document (*Data Inventory Method for Off-site Suppliers of Pulp*) exists for suppliers of off-site processed pulp. The off-site mills should complete this document, and submit the required data for inclusion in the Load Point calculations.

1.0 Fibre-use Efficiency Measure⁴

⁴ The Fibre-use Efficiency Measure approach is consistent with and has been sourced from the Canadian Standards Association's *Guideline for Life Cycle Impact Assessment: Pulp and Paper Production Phase*, CAN/CSA-Z810-96, final draft dated July 1996.

The Fibre-use Efficiency Measure represents the quantity of fibre needed to manufacture one air dry metric ton (ADMT) of product, and provides a measure of how efficiently fibrous resources are used.

Things to remember when calculating the Fibre-use Efficiency Measure:

- a) Data collection includes all raw, recovered and non-wood fibre used to manufacture the product.
- b) Calculations include only the fibrous portions of material inputs. They will *not* include additional non-fibre materials purposely added to the product (e.g. fillers) and the coatings, inks and fillers already present in recovered fibre sources.
- c) The final quantification will be into ADMT of fibre consumed per ADMT of product.

1.1 Fibre Type Definitions and Multipliers

To account for the different environmental impacts of different fibre sources, these sources are "weighted" in the calculations. The weights effectively credit the efficient use of fibre (e.g. favouring the use of recycled resources over the use of virgin wood resources).

Fibre Type Definition	Applicable Definitions	Multiplier
Raw Wood Fibre	"Raw wood fibre" means that fibre from wood which has not previously been pulped, and includes fibre from roundwood (whole logs) and wood chips.	1
Pre-consumer Materials	"Pre-consumer materials" are materials generated by an industrial process that would, unless diverted, enter the waste stream. It includes, but is not limited to, damaged or defective materials, overstock or obsolete inventories from manufacturers, distributors, wholesalers and trimmings from converting processes. It does not include wet or dry broke.	0.75
Planer Shavings, Sawdust and Alternative Fibre Sources	"Alternative fibre sources" includes, but are not limited to, hemp, cotton, bamboo, straw, plants cultivated specifically for use as a fibre source, and agricultural wastes. "Agricultural wastes" means a solid residue arising from the harvesting and processing of agricultural crops (e.g. dried stalks of harvested grain) which would otherwise be incinerated or sent to landfill.	0.33
Printed Recovered Materials	"Printed recovered materials" are those materials which have been printed and/or coated and, unless diverted, would enter the waste stream.	0
Post-consumer Materials	"Post-consumer materials" are those materials which have served their end-use at the consumer level, have been discarded by the consumer, and unless diverted, would enter the waste stream.	0

1.2 Calculations

All steps are easy-to-follow, and self-explanatory. In some cases, additional information is provided.