

Packaging Material Brief



Material Description	Name of the material - Acronym (if it exists) – Category Corrugated – Fiber based corrugated packaging
Applications	<ul style="list-style-type: none"> • Significance of this material in industry: <u>394.8 billion square feet of corrugated</u> (31.9 million tons of containerboard were produced by U.S. paperboard mills) Source of Information: Fibre Box Association Annual Report Date: 2006 • Major packaging process applications include: food, beverage, durables (i.e. consumer electronics) packaging, retail displays and many others. Corrugated can be used as primary, secondary and tertiary (transport) packaging. The industry produces a variety of corrugated to meet particular needs. <ul style="list-style-type: none"> Unbleached (Kraft) corrugated is primarily used for transport and secondary packaging and is the most common variety. Bleached and semi-bleached are primarily used in retail packaging and displays, since they are superior surfaces for multi-color flexographic (water-based ink) printing and graphics due to their high color contrast. Pre-print is an option whereby the liner is printed offline prior to corrugation, allowing for higher graphic resolution in high-volume runs. Mini-flute is a common substrate for high-resolution graphics retail packaging and is often used as a substitute for folding carton. Wax and wax-alternative coated corrugated are used in applications requiring moisture resistance, such as produce. Source: Fibre Box Association • Examples of packages obtained from this material: boxes, displays, cushioning, and supports • There are no other major applications of this material in industry besides packaging.

Environmental performance and impacts

7 R's of Packaging

Reduce	<p>Name some examples that apply to this material/applications on packages :</p> <p>The corrugated packaging industry practices continuous source reduction. From 1994 to 2005 the amount of corrugated used to ship a unit of domestic industrial production has decreased by 19 percent. Corrugated manufacturers have contributed significantly to this reduction by designing more efficient packages, stronger papers and improving boxplant converting processes.</p> <p>Because corrugated packaging is custom designed and can be printed with high-impact graphics, it is a shipping container that can double as a merchandising package, helping product suppliers to reduce the amount of packaging required to successfully bring their goods to market.</p> <p>Source: Fibre Box Association</p>
---------------	--

<p>Reuse</p>	<p>Name some examples of how this material can be reused for other applications: Corrugated is reusable in many applications and can be designed for reusability in consumer products as well closed loop business and storage applications.</p> <p>Source: Fibre Box Association</p>
<p>Revenue</p>	<p>Describe the material's current revenue situation in the market (could be virgin or recycle, specify which one): Raw material prices according to _____ Market Date: ___/___/___</p> <p><u>Comments:</u> Please refer to the publications noted below for raw material prices.</p> <p>On an inflation-adjusted basis, the average cost of a corrugated container has remained constant over the last 10 years (1997 – 2007). (FBA)</p> <p>Corrugated packaging is the most recycled form of packaging because of its high recovery value as a fiber or energy source. Corrugated packaging provides solutions at an economical value. These solutions include:</p> <ul style="list-style-type: none"> ▪ Freight cost reduction through improved cube efficiency ▪ Handling/labor reduction with display ready shipping containers ▪ Lower packaging costs through high performance designs with optimal material usage <p>As a matter of policy and for anti-trust reasons the Fibre Box Association does not engage in discussions regarding the pricing of our member's products or their raw material input(s). That being said, there are a number of publications that monitor the market for linerboard, but all require a subscription. These sources will report different prices depending on their method of collecting the information and how they respond to the input. From past experience, the best way to look at any of them is as indicators of movement, not of actual pricing of ongoing transactions.</p> <p>Some of the publications that monitor the linerboard movements in the corrugated industry are: Official Board Markets, Board Converting News, Pulp and Paper News.</p>
<p>Renew</p>	<p>Percentage of renewable content in this material (based on ASTM D6866): approaching 100% - virtually 100% of corrugated is renewable by weight</p> <p>Corrugated is a renewable resource: wood fiber grown under sustainable practices and recycled fiber. 93 percent of all corrugated boxes produced in the United States are supplied by Sustainable Forestry Initiative® (SFI) program participants.</p> <p>The forest products industry plants 1.7 million new trees every day, contributing to the long-term viability of North American forests, preserving wildlife habitats, sequestering carbon dioxide and offsetting greenhouse gas emissions. (SFI)</p> <p>More wood grows in our nation's forests than is harvested (about 49 percent more), documenting wood fiber as a renewable resource. (USDA Forest Service)</p>

Remove	<p>Name some examples that apply to this material/applications on packages: Using corrugated packaging, design professionals can create innovative packages designed to eliminate less recyclable components.</p> <p>Source: Fibre Box Association</p>
Recycling Data	<p><i>Read LCI data below</i></p> <p>Material identification (SPI code if applies):</p>  <p>Corrugated Recycles</p> <p>Corrugated is highly recyclable; In 2005, 76.6% percent of all containers produced in the U.S. were recovered for recycling. While there are many uses for OCC (Old Corrugated Containers), 61% of all recovered OCC goes in to new corrugated containers. The average corrugated box is comprised of 43% recovered fibers.</p> <p>Less than 5 percent of corrugated containers used for packaging perishables items have been treated with materials that made them non-recyclable (primarily wax). Wax-alternative moisture resistant coatings are now being marketed that are recyclable and the industry has developed a test protocol that, when passed, allows them to be labeled as such and placed into the OCC recycle stream. The symbol for meeting this testing protocol follows:</p>  <p>Corrugated Recycles</p> <p>All of this minimizes waste to Wal-Mart and its customers.</p> <p>It is possible that your material could be recycled with others materials. Please name materials that could be compatible for recycling: Folding carton and boxboard</p>
Read	<p>Information from trade associations, organizations, government agencies and other sources. Published papers, websites and recommended literature.</p> <p>Some sources for additional information are as follows:</p> <ul style="list-style-type: none">• Fibre Box Association www.fibrebox.org• American Forest and Paper Association www.afandpa.org• Corrugated Packaging Alliance www.corrugated.org• Corrugated Recycling Statistics stats.paperrecycles.org• Sustainable Forestry Initiative www.sfiprogram.org• USDA Forest Service www.fs.fed.us• Abundant Forest Alliance www.abundantforests.org• Technical Association of the Pulp & Paper Industry www.tappi.org

LCI Data	<p>(Note that LCI data does not include converting.)</p> <p>Emissions factor for:</p> <p>Virgin material:</p> <p>Recycled material content:</p> <p>Industry average, recycle content: 43% recycle content; the industry does not track post-consumer recycle content.</p> <ul style="list-style-type: none">• Total energy required for raw material manufacture (Megajoules/Kg): 20.9• Green House Emissions (normalized to CO₂; kg/kg material produced): 0.479• Waste per kg of material produced: 0.0559 <p><i>Note: Last 3 bullets above are from 2004 LCI data.</i></p> <hr/> <p>End-of-life packaging issues:</p> <ul style="list-style-type: none">• Landfill (What happens when it goes to a landfill?) (Data provided by EPA):• Recycling (Is this material recyclable? What is the current recycle rate?) (Data provided by EPA):• Combustion (The % of this material that is currently being incinerated or going to WTE)(Data provided by EPA):• Composting/Anaerobic Digestion (The % of this material that is currently being composted or digested) (Data provided by EPA): <p>(Base on ASTM D6400 or ASTM D6868 - applicable for paper and plastics)</p>
-----------------	---

Physical Properties

Basic performance characteristics:

For raw materials:

Brightness: N/A

(based in ASTM D985-97(2002)/ISO2470:1999 and ISO 2469)

Burst Strength at yield (psi): Corrugated board is manufactured to provide a wide range of burst strengths, depending upon final application. The range for uncoated single-wall and double-wall construction is from 125 to 650 psi. Refer to "Puncture Resistance" below for information regarding triple-wall construction. (per TAPPI T-810)

TAPPI (Technical Association of the Pulp & Paper Industry) is the paper and corrugated industry's source for official test methods.

Carbon Dioxide transmission rate (cm³/m²/day) (°C, % RH): N/A

Density (lb/msf): Uncoated corrugated board component densities vary widely, but typically range from 80 to 550 pounds per thousand square feet (msf). "Pounds per msf (lb/msf)" is the industry-standard unit of measure for density. (per TAPPI T-410 / ASTM D-646)

Dimensional Stability: N/A

Flexural Modulus: N/A

OTR (Oxygen transmission rate): N/A
(Consistent with ASTM D-3985, plastics)

Optical Clarity, (haze): N/A
(Per ASTM 1003)

Porosity %(air permeability): N/A
(based in ISO 5636-1:1984)

Puncture Resistance (psi): Puncture resistance is only applicable to triple-wall corrugated board construction. Note that triple-wall corrugated board is manufactured to provide a wide range of puncture resistance, depending upon final application. The range for uncoated triple-wall construction is from 700 to 1500 psi. (per TAPPI T-803)

Stiffness (Newtons/Meter): N/A
(based in ISO 2493/ASTM D5342 and ASTM D5650)

Tensile Elongation at yield: N/A
(Per ASTM D-638)

Thickness (in/mm): The thickness of corrugated board is referred to by the term caliper in the industry. Due to the wide range of various uncoated corrugated board constructions available, the caliper can range from 0.090" – 0.700". (Per TAPPI T-411)

WVTR (Water Vapor Transmission Rate): N/A.
(Consistent with ASTM F1249)

For packaging applications:

Common additives used (if applies):(e.g. antioxidants, heat stabilizers, UV stabilizers, antistatic agents, pigments, etc)

N/A

Note: The units can vary depending on the material

Comments: Corrugated is a made from naturally occurring fiber and is an engineered packaging material. The basis weight, burst strength, thickness (caliper) and compression strength, along with many other performance characteristics, are variable and are determined according to the packaging application requirements.

Source: **Fibre Box Association**

References:

Fibre Box Association