TECHNICAL DATA SHEET

Norampac Corrugated Packaging Materials

General information and company description

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Composition of a Corrugated Container

The basic component materials of corrugated shipping containers are known in the pulp and paper industry as “Containerboards”. Containerboard is the general term for those materials used in the manufacture of corrugated or solid-fibre shipping containers. In the corrugated field, two categories of containerboard are used. One is “linerboard”, the flat facing on each side of the combined board, and the other is “corrugating medium”, the fluted member affixed between the flat facings.

Containerboards can be made from two kinds of fibres – “virgin” and “secondary”.

Virgin fibre comes directly from the tree and is experiencing its first use as a papermaking fibre in a linerboard sheet. Secondary fibre is used to include both “recycled” and “recovered” material. The source of secondary fibre is generally paperboard waste or any other types of papers, such as corrugated containers, corrugator trim, and other paper or board materials that have been recycled at least once. Both linerboard and corrugating medium can be wholly virgin, wholly secondary, or a mixture of the two in various proportions.

Norampac Inc. produces both virgin and secondary fibre boards, as shown in the mills description table (last page).

MSDS Requirements and Legislation

The “right to know legislation” known as WHMIS is law and became effective October 31, 1988. Under the regulations quoted by Bill No. 79, the following conditions are present:

“Subject to subsection (4) this regulation does not apply where the hazardous material is:
a wood or a product made of wood;
a tobacco or a product made of tobacco;
a manufactured article"

As a result of this legislation, we are not required to submit material safety data sheets (MSDS) for our corrugated products. For exceptions provided by this same legislation, we also do not have MSDS documentation for the linerboard or medium used in our manufacturing process. We are however, required to have MSDS documentation on file for our starch, adhesive, ink, wax, barrier coating or any other chemical involved in the manufacturing process.

The Acidity-Alkalinity (pH) Value of Linerboard

It is important to understand that the pH level of a given linerboard is totally is dependent on the manufacturing process employed at the mill.

The aim of our linerboard suppliers is to make a product with a pH range of 7.2 to 7.9; but the best guideline is to expect a linerboard pH to range from 6.5 to 8.5. In any case, our linerboards are produced in alkaline processes and can therefore be considered acid-free.

Fire Hazard

Corrugated containers are made from wood fibres which are flammable under certain conditions. Flash point is often use to characterise the flammability of a given product. Flash point is defined as the lowest temperature which a vapour-air mix can ignite or explode with the presence of an ignition source. Paper flash point is not currently available in literature. Usually, paper is stable under normal conditions and will not ignite if not directly exposed to an ignition source or elevated temperature. Auto-ignition can occur if corrugated containers are exposed to elevated temperature.

Auto-ignition is defined as the minimal temperature which a given product can ignite without ignition source. While auto-ignition temperature is not reported, for corrugated containers and products made from wood fibres, at a temperature up to ~200 ^{o}C, carbon dioxide and traces of organic compounds are formed. Also, temperatures in excess of 200 ^{o}C lead to much more rapid decomposition. At that point, an auto-ignition can occur. However, hazardous situation was reported in literature [1] : “… self-ignition at temperature as low as 100 ^{o}C has been observed. (…) To provide a margin of safety, 77 ^{o}C should be the upper limit in prolonged exposure near heating devices.”

Food Contact Applications

Packaging materials supplied by Norampac Inc., are not and do not include hazardous substances as defined in current legislation. It is Norampac's practice, and that of our suppliers, to avoid the use of packaging materials that contain deleterious substances in amounts harmful to the environment under normal package disposal conditions. Packaging materials is covered by the Recycled Paperboard Technical Association Chemical Testing Protocol for Food Contact Paperboard made from Recycled Fibres. This protocol is based on *FDA guidance for calculating potential exposure* and *California EPA's guidance for complying with Proposition 65*.

Norampac inc., corrugated packaging materials are stored in a clean environment, shipped in trucks, and are free from all animal or insect infestation.

Based on this information, corrugated products manufactured by Norampac Inc. are suitable for, and compliant with, Canadian and American food packaging regulations.

Corrugated containers supplied by Norampac Inc. are not manufactured with and do not contain the following chemicals in amounts that may be hazardous to human health :

- **Heavy metals** : Meet the CONEG guidelines for lead, mercury, cadmium and hexavalent chromium and also comply to ASTM F963-03 and 16 CFR 1303 requirements. The following metals are also analyzed according to the RPTA protocol : Antimony, Arsenic, Barium, Beryllium, Copper, Manganese, Nickel, Selenium, Silver and Zinc.
- **Polyaromatic hydrocarbons** (PAHs)
- **Polychlorinated biphenyls** (PCBs)
- **Pesticides**
- **Semi-volatile organic compounds** (SVOCs)
- **Volatile organic compounds** (VOCs)
- **Dioxins and furans**
- **Ozone depleting substances** (chloro-fluoro-carbons (CFCs))
- **Bacteria** : Meet the Dairyman Standard requirements

Shelf-life of Corrugated Containers

Unfortunately, while we are in an excellent position to estimate the creep in the performance of a specific carton under dynamic or static stress, we cannot do the same for an item in storage, i.e. before using it. While we cannot give precise time frames for suitable storage periods, we recommend practices that will help to maximise the shelf life of combined corrugated board. There are several precautions that can be taken.

- Rotate the stock in the warehouse environment with new containers as they become available. For many of the standard styles of carton this can be done by referring to the date printed at the time of manufacture on the bottom inside flap of the box.
- Maintain an ambient storage environment close to 23 degrees Celsius and 50% relative humidity.
- Protect the corrugated containers against moisture, soiling, and damage to the greatest degree possible. This includes storage in racks or on pallets to avoid contact with unsealed concrete flooring.
- Store all items flat rather than standing upright on the edge. This will help to eliminate warp. It is also a good idea to avoid crushing the flutes by minimising the amount of weight stacked on each unit.
- For extended periods of storage, consider the addition of a wet strength adhesive to the starch bond. This additive can be supplied at the manufacturing stage by any corrugated supplier. This serves to prevent a moisture loss or a moisture gain to the bond created between the liners and medium.

Norampac linerboard and medium mills

Mill	Products	Raw materials (2004)			Certifications
		Virgin	Post Consumer	Pre-Consumer	
Norampac inc., Division Cabano 200, rue Cascades, C.P. 190 Cabano, Quebec, Canada G0L 1E0	Corrugating medium	64 %	36 %	0 %	ISO 9002 (1994)
Norampac Inc., Burnaby Division 8255 Wiggins Street, Building B Burnaby, British Columbia, Canada V3N 2V7	Brown linerboard White top linerboard Recycled medium	2 %	83 %	15 %	-
Norampac inc., Division Kingsey Falls 398, boul. Marie-Victorin, C.P. 119 Kingsey Falls, Quebec, Canada J0A 1B0	Brown linerboard White top linerboard (coated and uncoated)	0 %	90 %	10 %	ISO 9001 : 2000 (1994) ISO 14001 (2001)
Norampac Inc., Mississauga Division 7447 Bramalea Road Mississauga, Ontario, Canada L5S 1C4	Brown linerboard White top linerboard	0 %	72 %	28 %	ISO 9002 (1996)
Norampac Industries Inc., Niagara Falls Division 4001 Packard Road Niagara Falls, New York, United States 14303	Corrugating medium	0 %	100 %	0 %	-
Norampac Inc., Red Rock Division Highway 628 Baker Street Red Rock, Ontario, Canada P0T 2P0	Brown linerboard	100 %	0 %	0 %	ISO 9002 (1999)
Norampac Inc., Trenton Division 300 Marmora Street, P.O. Box 807 Trenton, Ontario, Canada K8V 5R8	Corrugating medium	60 %	35 %	5 %	ISO 9002 (1995)