Environmental Aspects of Clarifoil Cellulose Diacetate Film

Clarifoil is the trade name for a range of films based on cellulose diacetate. From very glossy, highly transparent films to semi-matt and matt films, covering a thickness range from 14µ - 500µ. The properties of these films reflect their cellulosic origins and thus offer an attractive combination of environmental features. Their cellulosic nature also makes Clarifoil films ideally suited to be used in contact with paper and board in packaging applications such as window cartons and film-laminated printed material.

Clarifoil Manufacture

The diacetate raw material is produced by treating cellulose from wood pulp or cotton linters with acetic anhydride. The resulting flake is mixed with a small proportion of plasticiser and traces of anti-block compound and is cast onto a continuous band to produce a non-oriented film with exceptional optical properties.

The major raw material, cellulose, comes predominantly from SFI (Sustainable Forestry Initiative®) managed forestry in North America. The (SFI) program is based on the premise that responsible environmental behaviour and sound business decisions can co-exist to the benefit of landowners, manufacturers, shareholders, customers, the people they serve, the environment, and future generations.

The SFI program integrates the perpetual growing and harvesting of trees with the protection of wildlife, plants, soil, water, and air quality. The trees that are harvested are naturally grown and are certified as 100% GM free.

For more information please visit http://www.sfiprogram.org

Clarifoil is distinguished from most other thermoplastic films in that it comes from a sustainable resource and its main component is not derived from fossil fuels. The secondary raw material is acetic anhydride, a simple derivative of the everyday tabletop chemical, acetic acid.

A range of different plasticisers are used in Clarifoil films, depending on the end use. These include glycerol triacetate (triacetin), which is itself a direct food additive and can be naturally derived.

EN 13432 / ASTM D 6400 / Vincotte OK Compost Home

The EN 13432 and ASTM D 6400 are the European and American industry standards for industrial biodegradability and compostability respectively. There are four requirements necessary to gain accreditation to these standards:

1) Heavy metal content – The films heavy metal content should fall within a pre-defined level described by the standards.
2) Disintegration – The film should disintegrate into pieces <2mm within a 12 week period when subjected to composting conditions.
3) Biodegradation – The film must biodegrade within a six month period to at least 90% of a reference cellulose sample.
4) Plant eco-toxicity – The resulting compost produced from part 3 is used to grow a selection of plants to ensure any bi-products of degradation are not harmful to plant life.
Clarifoil have attained both the EN 13432 and ASTM D 6400 standards for all standard grades up to and including 106µ, please see certificates attached. In addition, Clarifoil cellulose acetate films have accreditation to the Vincotte OK Compost Home program which requires biopolymers to be compostable at significantly lower temperatures when compared to industrial conditions. With the increase in popularity of home composting and increasing pressure on efficient waste management on both industry and the public, the OK Compost Home certification is extremely important to the environmental credentials of Clarifoil films.

It should be noted that despite its inherent biodegradability, Clarifoil is very stable and does not break down in normal end-use conditions.

Environmental Legislation

The last few years has seen national and inter-national legislation being introduced worldwide to minimise the environmental burden of packaging materials. In Europe, for instance, legislation is designed to reduce packaging levels wherever possible and to encourage re-use or re-cycling of materials, or alternatively composting or incineration with energy recovery. Targets have been set for recycling and recovery of packaging across the various material types - glass, metals, paper and board, plastics and others.

European legislation also calls for very low heavy metal content in packaging materials, in line with the US Coneg limits. Clarifoil has, for many years, complied with these levels.

Influence of Clarifoil cellulose diacetate film on the paper waste stream.

Pira International has conducted independent investigations on the influence of our cellulose diacetate film on the paper waste stream. Using both FINAT and INGEDE methods of dispersion and fragmentation they demonstrated that our 50μm film passed 5.8% (FINAT) and 2.0% (INGEDE) through the screen, and would not be anticipated to cause difficulties in recycling.

In other re-pulping tests, it has been demonstrated that printed media laminated with Clarifoil cellulose acetate films produce a cleaner, brighter and higher quality re-pulped material when compared to printed media laminated with, for example, OPP films. This is believed to be due to the fact that on re-pulping, the adhesive and ink preferentially adhere to the acetate film leaving behind a much cleaner paper/pulp material.

Nevertheless we cannot guarantee that our film will have no influence on the paper waste stream as each individual recycling centre uses their own unique conditions and therefore the results cannot be reliably used with confidence across the entire industry.

Compostable plastics are designed for organic recycling. They are clearly marked for this purpose with logos such as the Seedling logo. The main raw material in cellulose diacetate film is cellulose, a natural resource from sustainably sourced SFI-certified wood pulp, which is free of genetically-modified-organisms. The film is compostable where facilities exist – see above.

As we develop new film formulations for new applications we carry out a range of assessments on the suitability of the chemicals used, including their REACH status. We will continue to ensure that our films meet legislative requirements and that they are safe and fit for purpose in their intended end uses.
Recycling with Clarifoil

In principle Clarifoil film is readily recyclable. It is easily re-dissolved and filtered for casting, to yield a first quality recycled film. Since the Clarifoil manufacturing process is relatively low temperature, no thermal degradation of the polymer occurs, as can happen with melt processed polymers. Thus virtually all in-house waste and worthwhile quantities of redundant film from customers is currently re-processed in our plant to produce first quality film.

In practice Clarifoil is usually used in combination with paper or board in packaging applications, either bonded around the edge of a window in a folding carton, or laminated to the surface of printed board, thus other possibilities arise:

Incineration with Energy Recovery

Where mixed waste arises, in many cases the most sensible disposal option is to incinerate at high temperature with energy recovery, rather than to attempt to separate materials and process them down different waste streams. Fully combusted Clarifoil produces only carbon dioxide, water and a little non-toxic inorganic ash. It has a calorific value around 20MJ/kg, making it worthwhile to recover the energy for heating purposes.

Summary

Clarifoil is derived mainly from sustainable non-fossil fuel resources. Its cellulosic origin provides a number of attractive environmental options and gives it a unique versatility for packaging waste recovery.

For additional guidance or technical information contact Clarifoil Technical Support:
Telephone: 00 44 1332 68 1307 or 00 44 1332 68 1210
Fax: 00 44 1332 66 0178
e-mail: kevin.g.parker@celanese.com
NOTIFICATION OF REGISTRATION

The company

Clarifoil
1 Holme Lane, Spondon
DERBY DE21 7BS
GREAT BRITAIN

hereby receives the confirmation that the product/s

Compostable intermediates

of the type

Clarifoil T17 Cellulose Acetate Film

conforms to

DIN EN 13432:2000-12
Certification scheme products made of compostable materials (Edition: 2006-08)

Registration No.: 7H0054

This Notification of Registration is valid in connection with above stated Registration No. for an unlimited period and becomes ineffective only upon termination.

See annex for further information.

DIN CERTCO Gesellschaft für Konformitätsbewertung mbH
Alboinstraße 56, 12103 Berlin

2010-11-02
Dipl.-Ing. (FH) Dipl.-Wi.-Ing. Sören Scholz
- Head of Certification Body -

Every effort has been made to ensure that this information is correct and in accordance with current knowledge. While information given describes known applications for the product, no warranty of fitness for purpose is intended.
NOTIFICATION OF REGISTRATION

The company

Clarifoil
1 Holme Lane, Spondon
DERBY DE21 7BS
GREAT BRITAIN

hereby receives the confirmation that the product/s

Compostable intermediates

of the type

Clarifoil T24 Cellulose Acetate Film

conforms to

DIN EN 13432:2000-12
Certification scheme products made of compostable materials (Edition: 2006-08)

Registration No.: 7H0055

This Notification of Registration is valid in connection with above stated Registration No. for an unlimited period and becomes ineffective only upon termination.

See annex for further information.

DIN CERTCO Gesellschaft für Konformitätsbewertung mbH
Alboinstraße 56, 12103 Berlin

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CERTIFICATE

for Products

THIS IS TO CERTIFY that the following PRODUCTS have been found to comply with the specifications established in the American Society for Testing and Materials standard ASTM D6400 and/or D6868 in accordance with the terms and conditions of the "Biodegradable Products Institute – Certification Program for Products Made of Compostable Plastics – Program Rules".

- Cellulose acetate based plasticized films manufactured by Clarifoil with a maximum thickness of 95 microns (3.74 mils) and sold as Clarifoil T17 films. [J-00137209]

as further described in the application and related information submitted to the Biodegradable Products Institute by Celanese Acetate Ltd (Clarifoil) Corporation, (the "Licensee") a corporation of United Kingdom.

Specific products associated with these certifications can be found on the BPI Product Catalog: http://products.bpiworld.org/companies/celanese-acetate-ltd-clarifoil

This Certificate authorizes the Licensee to use the Certification Program Logo depicted below in relation to such Product, subject to all conditions and terms of the Program Rules and the License Agreement between the Biodegradable Products Institute and the Licensee.

Valid until: April 04, 2017
Certificate #: 891032-2