

# PLUSS<sup>®</sup>



Pluss Polymers is an offshoot of Manas, established to develop and market new technologies and products developed inhouse. Pluss Polymers was incorporated in 1993 to commercialise the technology for grafted modified polymers and alloys and blends. Backed by competent technical staff, laboratory facilities, a good library and technical database with a retrievable wealth of information marketed the OPTIM<sup>®</sup> brand of grafted polymers for the first time in India in 1996.

OPTIM<sup>®</sup> coupling agents and compatibilisers allow plastics manufacturers of world class quality products to *OPTIMise* their compound properties. The ADNYL<sup>®</sup> range of nylon alloys provide the user with extra tough nylon for increased strength.

Profiles and other rigid and flexible containers for thermal energy storage have also been introduced in India for the first time by Pluss Polymers.

# PAPYRUS

## Synthetic Paper Compound

**PLUSS®**

### TECHNICAL DATA SHEET

Product	: Papyrus E-04
Description	: Papyrus E-04 is an HDPE based compound to produce co-extruded HDPE synthetic paper.
Appearance	: Free flowing white granules / pellets.
<b>Properties</b>	<b>E-04</b>
Density (g/ml)	1.18
MFI @ 190°C/2.16 kg (g/10min)	5.0

### Applications

Papyrus E-04 is co-extrudable with HDPE to form a surface layer which gives a paper feel to the composite plastics film. This synthetic paper remains 100% plastics in terms of properties like water resistance, durability, excellent tear initiation & propagation resistance, folding & flexing endurance, mildew & termite resistance. Additionally, it has unique properties of high tensile and tear strength, even when wet with water or solvent based coatings. This makes it convenient to handle during various conversion processes and applications.

Some of the typical applications would include printed calendars, brochures, machine manuals, children's books, maps, labels and the like. In unprinted form, it can be used as stationery for exclusive usage as well as doctor's prescriptions, mailing and courier envelopes etc. Aesthetics and ability to withstand repeated folding/unfolding and in some cases mishandling, become the products unique selling point.

### Printability

It has traditional paper like characteristics such as easy printability with silk screen, offset gravure and flexography; writability with ballpoint pen and pencil and dead fold properties. Printing is bright & vibrant as the ink is not absorbed but has an excellent paper to ink anchorage.

### Comparison with BOPP based Synthetic Papers

Papyrus based synthetic papers can be made on standard two or three layer blown or cast film plants. Cast films are generally more flexible and tougher than blown film but have similar surface characteristics in the synthetic paper produced. Between HM-HDPE based and PP based synthetic papers by blown film route, the former can give rise to higher stiffness but both will have a high tear strength.

Papyrus based synthetic papers have excellent tear (propagation) resistance when compared with BOPP based synthetic paper.

### Synthetic Paper Production

Minimum three-layer coextrusion cast or blown equipment is required for producing synthetic paper. A two-layer film can also be made for some applications (such as envelopes), but will have tendency to curl due to dissimilar surfaces.

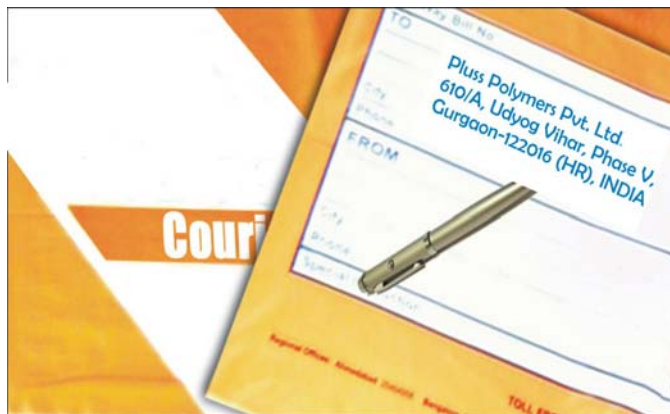
In blown film, a blow up ratio of four or higher is desirable, for good stiffness in the product. Corona treatment on the surface is essential for good print adhesion.

### Materials

In a typical 3-5 layer, the skin (outer & inner) layers are made of 100% papyrus compound. Generally, a 10-micron thickness of each skin is sufficient to provide the functional surface properties. Rest of the thickness of the synthetic paper is made up of the middle (core) layer, which thus determines bulk of the mechanical properties of the product. High Molecular Weight or HMW (low MFI) HDPE is the material of choice for the middle layer. TiO<sub>2</sub> masterbatch is added to the middle layer for opacity.

### Processing Conditions

Temperatures in extruders for different layers are so adjusted that melt viscosities of the different layers match for good bubble stability. The extruders should be free of contaminants and gels. Frequent use of a suitable purge compound is therefore recommended. Further, since Papyrus ingredients are polymeric materials (except calcium carbonate), so the screw and barrel life remains unaffected.



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