

# 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.

## TECHNICAL DATA SHEET

Product : **OPTIM® P-408 (for Filled Compounds)**  
Series : 400  
Description : Grafted Polypropylene with anhydride and acid functionality.  
Appearance : White to light yellow free flowing granules / pellets.

Properties	P-408
Density g/ml	0.91
T <sub>m</sub> (DSC) °C	163
MFI-190°C, 2.16 Kg	40
MAH content(%)	Very High
Second Proprietary Monomer	2% (approx.)

*Note: Very High - MAH content ranges from 1.6-2.5%*

### Applications

These **OPTIM®** grades are used as coupling agents for fillers and reinforcement in PP compounds. They also act as wetting and dispersing aids for colours and pigments. The polar functionality in these materials facilitates printability, paintability and receptivity to adhesives in the case of extruded and moulded products.

**OPTIM®** P-408 is based on homopolymer PP.

### As Coupling Agent for Fillers and Reinforcement

**OPTIM®** grafted polypropylenes act by improving interfacial adhesion between the filler and polymer matrix. Thus, the polar functional groups in **OPTIM®** bond with the surface of fillers like calcium carbonate, talc, mica and glass fibres, while the PP backbone mixes well with the matrix polymer. This results in better dispersion of the filler and enhancement of mechanical properties of the compound. Higher filler loadings are also made possible. In this, **OPTIM®** replaces part of the conventionally used low molecular weight additives and waxes which have a tendency to plate out and form undesirable die deposits during processing. By plasticating the melt these 400 series polypropylene based additives with their high MFI improve flow of the compound (thereby increasing productivity) and reduce melt imperfections.

In extruded products, **OPTIM®** containing compounds provide smoother surface finish. In addition, extruder stoppages, done for frequent cleaning of the die, are greatly reduced. In injection moulded products, better pigment dispersion and higher flow of the filled compound containing

**OPTIM®** make it possible to mould dimensionally stable thin wall parts or parts with a profile of varying thickness. Level of addition of **OPTIM® P-408** in these applications varies between 2 to 8% depending upon the mixing efficiency of the compounding equipment used.

### As Wetting and Dispersing Aid for Colours / Pigments

**OPTIM®** acts in this application the same way as it does in the filled PP compounds. The pigment agglomerates break down more effectively, leading to an increase in the 'strength' of the colourant for a given pigment loading. In colour masterbatches used for more critical applications like thin films such as BOPP and fibres, better pigment dispersion yielded by **OPTIM** not only brings about cost saving in application but increases productivity also. Again, depending on the preferred MFI, either **OPTIM® 408** can be used. Recommended usage level varies between 1 to 3% of total mix.

### Nylon Alloys

Series 400 **OPTIM** resins are based on PP, having acid and anhydride groups grafted on the back bone. Although polypropylene on its own will not blend with nylon but the anhydride groups react with the amine end groups in nylon and thus compatibilise PP moiety.

**OPTIM® P-408** may be alloyed with Nylons. Additional quantities of PP may be added. The resultant alloy marginally improves toughness of Nylon but markedly reduces water absorption giving better dimensional stability to a moulded component. It also facilitates wetting of glass fibres for improved dispersion and impact properties in glass filled nylon alloys. Other benefits associated with PP are obtained depending upon the proportion of PP in the alloy.

### Processing Conditions

These resins are mildly hygroscopic. Our recommendation is that prior to processing, the quantity of material to be used should be dried in a hopper dryer or oven at 80-85°C for about 2 hours. Maximum processing temperature should not exceed 280°C.

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