AARBOR COLORANTS CORPORATION

Technical Bulletin

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AArbor Monopigment Concentrate

Flush for Plastics.

Phthalocyanine Pigment Flushes for Plastics masterbatches.

AArbor's mono-pigment concentrated Flush for Plastics.

AArbor Code PE8801D, PE8800D & PE5200D is the trade name for phthalo blue and green flushes in high quality polyethylene wax. These are based on copper phthalocyanine pigments.

Plastic flushes are an established product for high quality masterbatches. For film and fibres.

AArbor flushes are similar to many multinational brands. These may differ from one another in composition, hue, chroma and color strength.

PRODUCT	COLOR INDEX	CHEMICAL NATURE	SIMILAR PRODUCT Manufacturer Product
AArbor Blue PE8801D	PB 15:1	Stabilised alpha modification with PE wax	Avecia Polymon ED Clariant Remafin AE
AArbor Blue PE8800D	PB 15:3	Beta modification with PE wax	
AArbor Green PE5200D	PG 7	Chlorinated cpc with PE wax	

PROPERTIES

The properties listed are determined according to following test conditions.

1. Physical properties :-

a) Bulk density : Similar to DIN 53194
b) Size : Sieving method
c) Pigment content : Ashing method.

2. Application properties :-

The flush is converted into standard masterbatch at 10% pigment level in LD before checking the following properties.

a) Coloristic properties : Checked in LD moulding chip.

b) Heat stability : This is checked in HDPE after keeping in injection barrel for 5 minutes at the stated temperature.

c) Film test : The film is taken out at 25 $\pm$ 5 m$\propto$ thickness at 4% pigment level 60 cm length x 10 cm width film is checked for dispersion (after converting flush into masterbatch).

d) Migration : A 2 x 2 cm piece is kept in contact with TiO_2 pigment white piece at 80^oC / 2 Hrs. under 100 gm/cm^2 load. The staining is checked after removal.

e) Light fastness : This data related to occasional testing on representative batches.

f) Heavy metals : As per AP 89 (1) regulation.

APPLICATION IN MASTERBATCHES

ADVANTAGES OF PLASTIC FLUSH FOR MASTERBATCHES –

- Most suitable for film and fibre
- Standardised colour strength.
- Excellent dispersion characteristics.
- High colour value.
- Agglomerate free.
- Non dusting.
- Reduction in losses.
- Increased productivity.
- High pigmentation easily possible.
- Ease of mixing.
- Higher filler loading.

PLASTIC FLUSHES

Various pigments have different dispersion characteristics. This depends upon

- Type of pigment
- Nature of surface treatment
- Polymer characteristics
- Dispersion additives
- Dispersion machinery

Among the pigments, high performance polycyclic pigments like phthalocyanines, quinacridones etc. are hard to disperse. Their dispersion hardness is high. The pigments for plastics need to be finer. As they become finer, the dispersion related problems increase.

The result is agglomeration, difficulty to achieve high pigment loading, lower colour strength, high energy input to achieve dispersion, necessity to use costly dispersion machinery, lower productivity and need strict control on process parameters.

This has severe effects in coloration of thin films and fine denier fibre production.
The films have specks, on continuity and may tear off. The film with such defects can not be used in many applications.
In fibre production, the agglomerated particles cause frequent choke up of spinnerates. This results in loss of productivity, more downtime and inferior quality of fibres. The properties of fibres are affected by oversized particles.

With the best of pigment powders the particle size achieved after dispersion could be 5 – 10 m∝.using best dispersion machineries. Thus, pigment powders have limitations to achieve fine dispersion, lower pigment loading is another limitation.

FLUSHES –

Flushing is an established technique of transferring the pigment from aqueous phase into the polymer of application. This began in ink industry wherein this is a standard technique.

Since the pigment is transferred from presscake stage into polymer, the particle size is maintained between 2 – 5 m∝. The agglomeration and hardening during conventional drying is avoided. The pigment primary particles are coated with polyethylene wax which prevents the pigment from reagglomeration. Since the pigment is already fully dispersed in wax which is compatible with the polymer, final masterbatch with any pigment level (below that of flush) is possible using even low shear dispersion machines.

The result is agglomerate free, high color strength stable dispersion which needs much less energy input.
The productivity increases. Handling of pigment powders result in dusty atmosphere. Flushes are easier to handle and they can be metered into machine in a better manner than powders, maintaining clean environment.

There is another advantage of maintaining lesser inventory of colours. Using selected primary flushes, a wide range of shades can be manufactured in a faster way.

AARBOR FLUSHES FOR PLASTICS –

They are made from plastic grade pigment press cake manufactured in our modern plant. AArbor offers 50% pigment content in high grade polyethylene wax.
The wax allows the flush to be used in Polyolefines and PVC. with which it is compatible.

The flushes are controlled for various quality parameters listed earlier.

MASTERBATCH MANUFACTURING

Formulation I –

Blue shade for thin film –

	A	**B**
	%	%
Pigment blue	---	25
PE wax	---	10
LLDPE	50	65
PE8800D (50%)	50	---
	100	100

Machine	**Single screw extruder**	**Twin screw extruder**
Pre-mixing	Not required	Required
Colour strength	110%	100%
Color	Brighter	----
Film	Clear, better	agglomerates observed
Dispersion	Easy	Difficult

Formulation II –

Green shade for moulding.

	A	**B**
Pigment green	---	8
PE wax	---	2
Calcium carbonate	23	20
LLDPE	61	70
PE5200D (50%)	16	---
	100	100

Pre-mixing	Not required	required
Machine	Single screw extruder	Kneader followed by single screw extruder.
Color strength	108%	100%
Colour	Brighter	---

SPECIFICATION

Product	Pigment Content	PE Wax	Size mm	Bulk Density	Heat Stability	Migration	Light fastness FT RT	Film test 25 m∝	Purity requirements (Heavy metals) AP 89(1) & EN 71 Melt temp. 106-108°C
AArbor Blue PE8801D	50	50	2 – 3		280°C	5	8 8	To pass	to pass
AArbor Blue PE8800D	50	50	2 – 3		280°C	5	8 8	To pass	to pass
AArbor Green PE5200D	50	50	2 – 3		300°C	5	8 8	To pass	to pass

Compatibility :

AArbor flushes are compatible with Low Density Polypropylene, High Density Polypropylene, PP (film, fibre, sheeting, containers, injection moulding).

AArbor flushes can also be used for coloration of rigid & flexible PVC (film, sheet, moulding etc.)