

Additives and Heat Stabilizer for PVC Plastisol



PATCHAM

A Sustainable Approach to Modern Coating Technology.

A Sustainable Approach to Modern Coating Technology

Patcham FZC is a well-established manufacturer of specialty additives headquartered in the United Arab Emirates. Since its inception, Patcham has steadily grown into a leading supplier of specialty additives for Paint & Coatings, Ink, PVC and Composite industries.

The company's Pat-Add range of coating additives includes wetting & dispersing agents, defoamers, slip & leveling agents, rheology modifiers. Whilst keeping focus on environmental sustainability, the company produces products using green raw materials that are APEO free and have low or no VOC.

These products are multi functional and multi compatible, which simplifies the production process, reduces the chance of errors and minimizes inventory thus improving cost effectiveness.

Patcham has built a strong manufacturing and R&D infrastructure that enables the rapid transition from concept to products. The company has strategically located technical service laboratories, offices and representatives around the world to provide the most efficient customer service. In addition, a well-developed robust supply chain network enables it to deliver its products and services to customers around the globe with minimal lead-time.



TABLE OF CONTENTS

Introduction

- Plastisols
- Applications
- Issues

Patcham Additives

- Wetting and Dispersing Agents
- Deaerators

Patcham Additives

- Heat Stabilizers
- Kickers

Introduction

What is a Plastisol?

PVC Plastisol are liquid dispersion systems of polyvinyl chloride and PVC copolymer resin in compatible plasticizers. The liquids may vary from viscosity from thin milk-like fluids to heavy pastes that have the consistency of molasses.

Main Ingredients	
PVC Resin	Fillers
Plasticizers	Solvents
Additive	Heat Stabilizers & Kickers



Figure 1. Color Master Paste of Plastisol



Figure 2. Various Applications of Plastisols

Application

The range of plastisol applications is extremely wide, and so is the variety of production methods.

Plastisol products include the following:

- Artificial leather (e.g. gloves, boots)
- Automotive artificial leather
- Dipped goods and dip coatings (e.g. tool handholds, bar ends)
- Toys (e.g. dolls, balls, toy, animals, anatomic models for education)
- Floorings
- Wall coverings
- Roofing membranes
- Carpet backing and heavy weight coatings
- Conveyor belts

Introduction

Issues

Raw Materials - Issues

- Long dispersion time
- Pigment streaks/Incomplete wetting
- Flooding and floating of colorants
- Storage stability

Rheology Factors - Issues

- High viscosity
- Poor air release due to pseudoplastic rheology

Application - Issues

- Pinholes
- Air entrapment
- Shade variations
- Low production yield



Figure 3. Long dispersion time

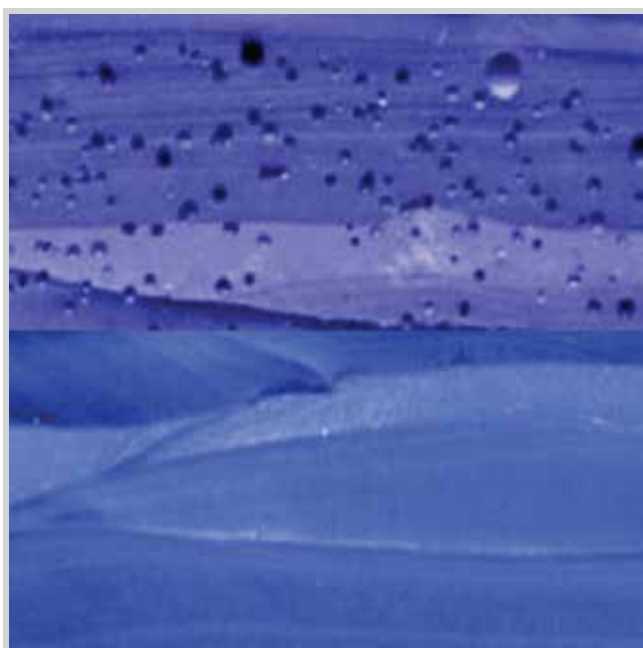


Figure 4. Air entrapment



Figure 5. Incomplete wetting/High viscosity

Patcham Additives

Wetting and dispersing additives

In dispersion of particles in plasticizer, there are deficiencies that need to be corrected through the use of additives. High viscosity, long dispersion time, flooding and unstable pigment concentrates are some of the issues related to wetting and dispersion (Figure 3 and 4).

Introduction of energy by the use of machines through high shear will break down agglomerated particles into its individual particles. If these individual particles are not fully stabilized, the finely distributed particles reaggregate and form flocculates (Figure 6).

Pat-Add wetting and dispersing additives stabilize the dispersed particles by adsorbing onto the surface of pigments or filler particles. Electrostatic repulsion or steric hindrance (Figure 7) will govern on the stabilization of individual particles of pigments/fillers.

For the specific application, it is recommended that compatibility with the plasticizer should be considered for selecting the best additive that will be utilized.

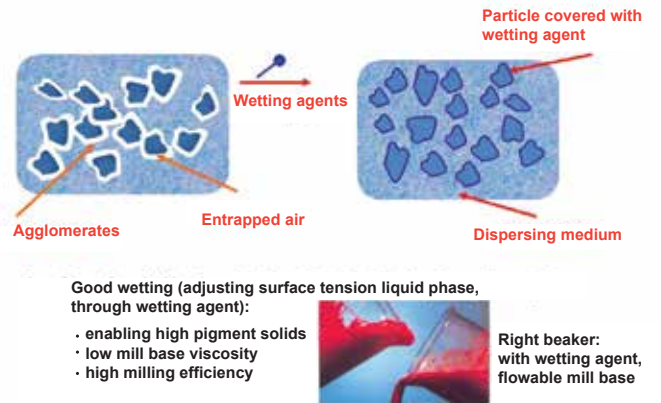


Figure 6. Wetting and dispersing process

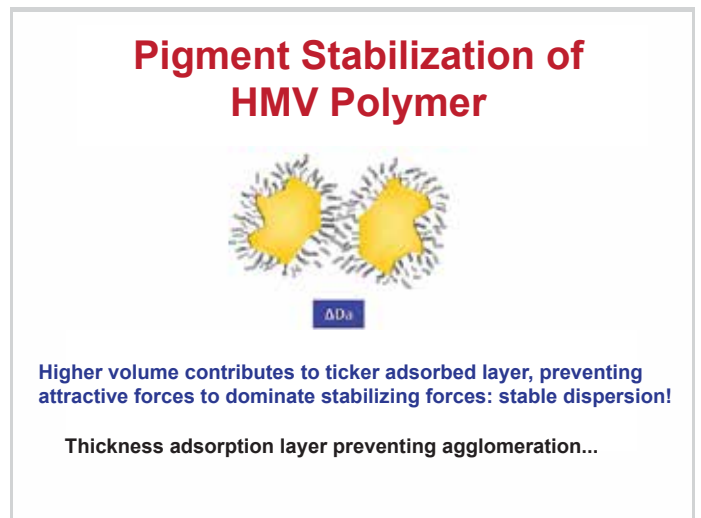


Figure 7. Stabilization of dispersed particles

Advantages of Pat-Add Wetting and Dispersing Additives:

- Higher pigment loading with constant viscosity
- Shorter dispersion time
- Excellent wetting of pigments and fillers
- Improved flow behavior
- Increase product yield
- Improved color homogeneity
- Longer storage stability of dispersions

Patcham Additives

Pat-Add DA 815

A multi-purpose solvent-free wetting and dispersing additive for PVC plastisol and thermoplastics. Its electroneutral composition enables it to stabilize organic and inorganic pigments, particularly carbon blacks.

Particularly suitable for the production of PVC Colorants/ Color Master paste for PVC. Pat-Add DA 815 creates a Newtonian behavior of the material by reducing viscosity.

Raw Materials	Yellow Iron Oxide	Phthalo Blue	Carmin Red
CI Number	PY 42	PB 15:3	PR 122
DOP	33.0	64.0	64.0
Pat-Add DA 815	2.0	14.0	14.0
Pigment	65.0	22.0	22.0
Total	100.0	100.0	100.0

Table 1. Guide formulation with Pat-Add DA 815



Figure 8. Newtonian viscosity of Pat-Add DA 815

Patcham Additives

Pat-Add DA 948

Pat-Add DA 948 is a High Molar Volume polymer, 100% active dispersing agent for use in plastisol pigment concentrates. The product is specially designed for use in EP- and PUR flooring systems based on polyols, UPR (unsaturated polyester)

Ingredients	White R-902	SP.Black 4	PB 15:4	PR 112	PY 83
DOP	23.20	55.00	55.00	60.00	65.00
Additive	1.80	10.00	7.50	6.00	4.00
Pigment	75.00	30.00	30.00	30.00	20.00
DOP	0.00	5.00	7.50	4.00	11.00
Total	100.00	100.00	100.00	100.00	100.00
% SOP	2.40	33.30	25.00	20.00	20.00

Table 2. Color master paste guide formulation with Pat-Add DA 948

Viscosity after one week stability at room temperature

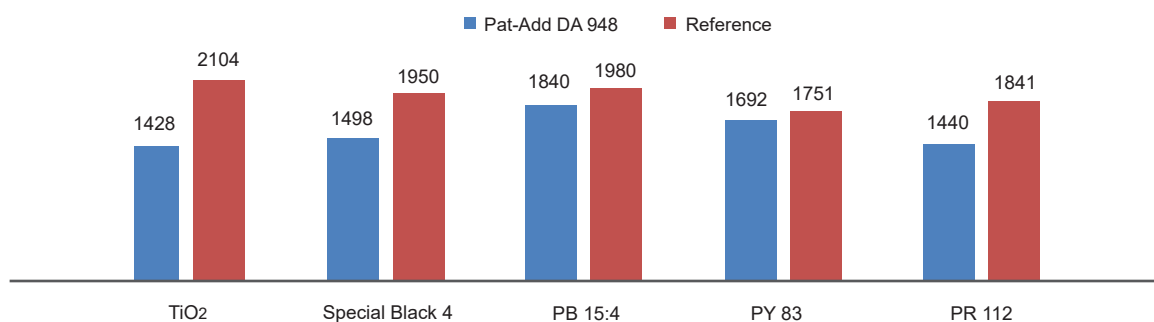


Figure 10. Actual appearance of color master with Pat-Add DA 948



Patcham Additives

Pat-Add DA 2025

Pat-Add DA 2025 is a wetting and dispersing agent for use in PVC plastisol.

Pat-Add DA 2025 is most effective for main inorganic pigments, including titanium dioxide as well as extenders. Also for blowing agents such as ADC and zinc oxide.



Figure 11. Pigment wetting of Pat-Add DA 2025



Figure 12. Pat-Add DA 2025 in three-roll mill

Raw Materials	Parts by weight
DOP	50.00
ADC Powder	50.00
Pat-Add DA 2025	0.25
Total	100.25

Table 3. Guide formulation with Pat-Add DA 2025

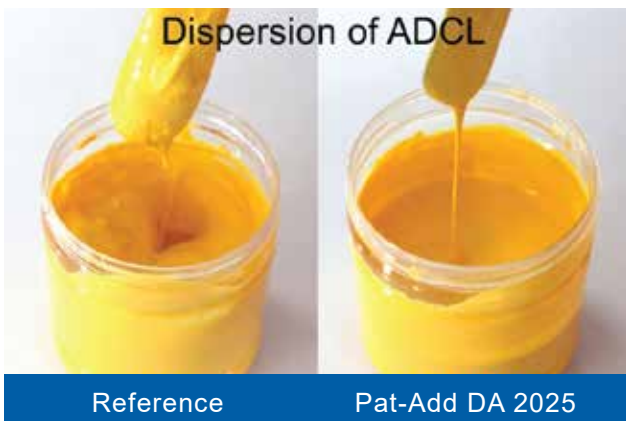
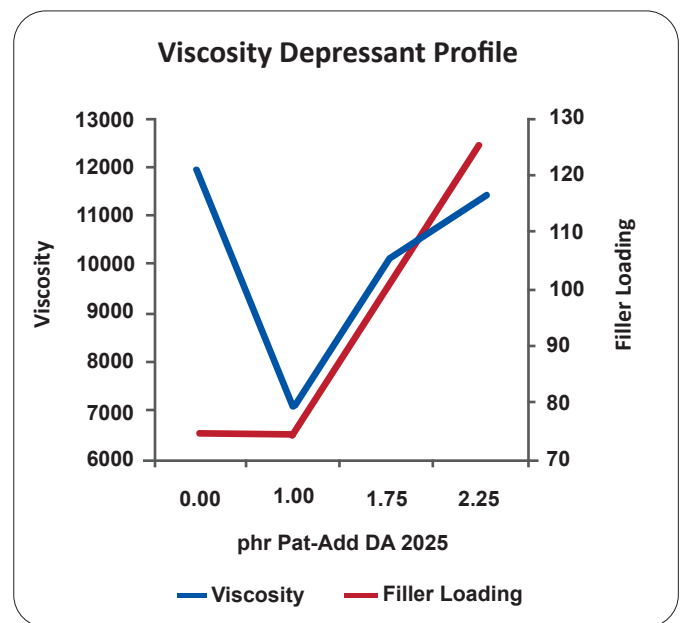


Figure 13 shows Pat-Add DA 2025 will allow higher filler loading without high viscosity build up. This will enable the formulator to make highly filled plastisol without compromising work ability of the paste.



Patcham Additives

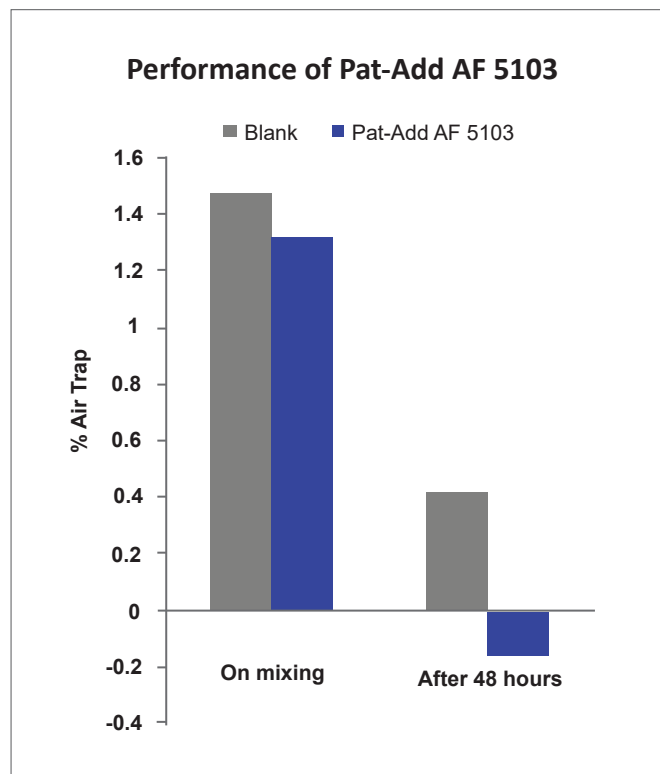
Deaerators

Pat-Add AF 5103

Pat-Add AF 5103 is a green bio based additive used as air release and de-airing agent. Pat-Add AF 5103 removes entrapped air in plastisol preparations and eliminates surface defects of cured plastisol articles.

Key benefits of Pat-Add AF 5103:

- Remove entrapped air during plastisol preparations.
- Avoid surface defects like pin holes.
- Attain smooth finish.
- Work with higher volumes more easily.
- No adverse effect in foam applications.



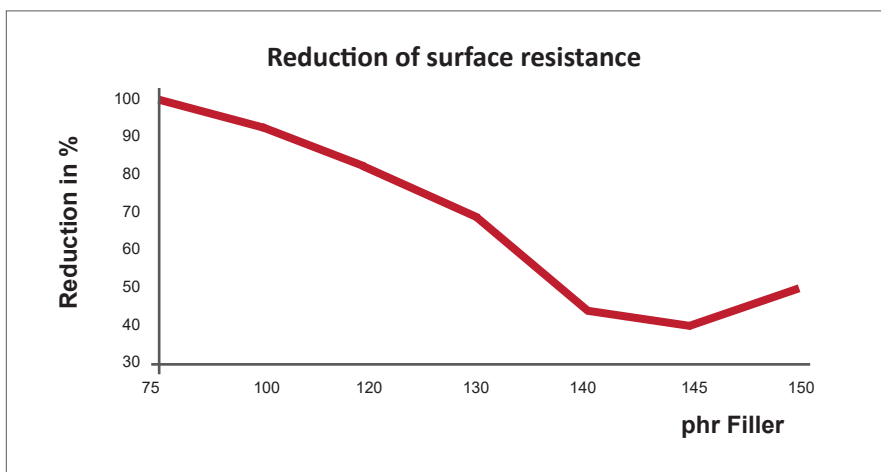
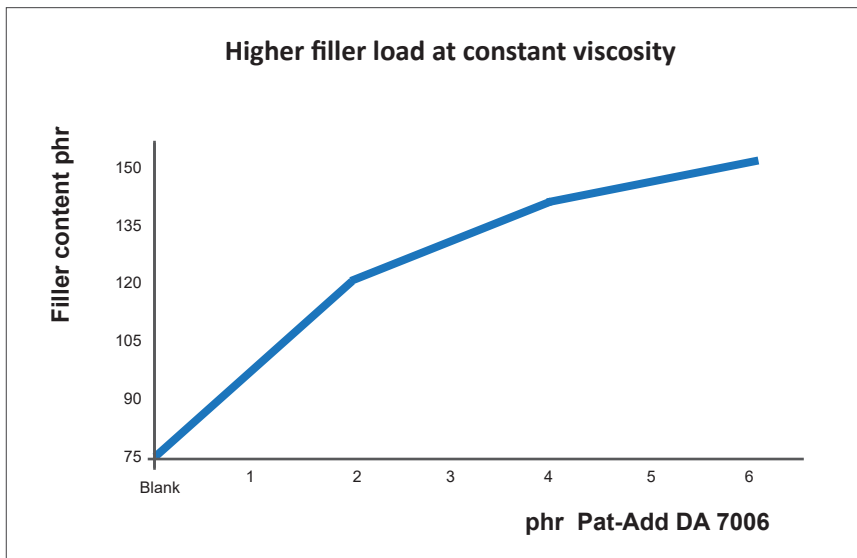
Patcham Additives

Pat-Add DA 7006

Pat-Add DA 7006 is a medium volatile viscosity depressant for PVC plastisols. It keeps the plastisol mass workable over long period of storage and prevents viscosity build up. It also allows incorporating more filler by keeping same viscosity of the PVC plastisols.

Main benefits are:

- High filler loading with constant viscosity
- Extremely effective for filler wetting
- Provides excellent stability of PVC plastisols without any sedimentation



Patcham Additives (PVC Heat Stabilizer)

Issues

- PVC resin needs relatively high processing temperatures
- Resin suffers heat degradation at the lower temperature than processing temperature
- Results in loss of properties
 - Mechanical
 - Colour

Heat Stabilizers

Type	Grade	
Barium / Zinc	Patstab 301	Low phenol, Nonylphenyl free
	Patstab 303	
	Patstab 307	
	Patstab 324	---
	Patstab 355 SF	PTBBA, 2-EHA free
Calcium / Zinc	Patstab 404	PTBBA, 2-EHA free
	Patstab 405	
	Patstab 411	
	Patstab 410	PTBBA, 2-EHA free phenol free Nonylphenyl free
	Patstab 401	---
	Patstab 409	
	Patstab 415	

Kickers

Kicker Potassium / Zinc	Patstab 701 (Fast) Patstab702 (Medium)	Phenol free
Kicker Barium / Zinc	Patstab 321K (Medium/ Fast)	
Kicker Calcium/ Zinc	Patstab 419K (Medium)	



PATCHAM

www.patchamltd.com

PATCHAM (FZC)

P.O. Box: 7753,
Saif Zone, Sharjah, UAE
Tel: +971-6-5570035
Fax: +971-6-5570038
Email: patcham@emirates.net.ae

PATCHAM INDIA

B-52, Pravasi Industrial Estate
Vishweshwar Nagar, Off Aarey Road
Goregoan (E), Mumbai - 400 063 (India)
Tel: +91-22-29272471

PATCHAM EUROPE BV

Klavermaten 65-1
7472 DD Goor
Netherlands
Email: eu@patchamltd.com

PATCHAM USA LLC

10 Commerce Road
Fairfield, New Jersey – 07004
Tel: (201) 293-4282
Fax: (201) 820-0818
Email: info@patchamusa.com