

# Watersol<sup>®</sup>



LET'S MAKE THIS WORLD AN  
ECO-FRIENDLY ONE

# COMPANY PROFILE

Arrow Greentech Ltd is a global green technology endorser that engineers and manufactures a wide variety of specifications for many different applications from its flagship product Watersol<sup>®</sup> (Arrow's Cast Water Soluble Film).

Driven by intellectual properties, Arrow Greentech Ltd (AGTL) aspires to be the first-choice of customers for Water Soluble Film (also known as WSF, PVA or PVOH film).

From carrying out a laboratory trial run in 1985, producing the first batch of water-soluble film in the country, AGTL has today put India on the world map by producing Watersol<sup>®</sup> Film on a commercial scale making all our lives a little easier and better.

Since the inception of AGTL in 1992, innovation has been the main driving force of our business, to ensure a sustainable future through maximum environmental care. In the past three decades, AGTL has transformed into a global sustainable solutions provider to many leading businesses across key geographic regions. With a focus on safety, innovation, productivity and performance, Arrow is positioned to be the leader in water soluble film technology. Being listed on both the National Stock Exchange (NSE) & the Bombay Stock Exchange (BSE), AGTL has its manufacturing and distribution units in India and in the United Kingdom, via its subsidiary Arrow Green Technologies (UK) Limited.



## Watersol<sup>®</sup> PRODUCT PROFILE

**Watersol<sup>®</sup> : Arrow's Cast Water Soluble Film (also known as PVA or PVOH film)** is a film that is environmentally-safe and is water-soluble & biodegradable when disposed of, either in water or in waste. Made from a blend of Polyvinyl Alcohol (PVOH) resins, water-soluble films have the tensile strength and flexibility to be used in multiple forms in various industrial applications. Consumers around the world have been demanding environment-friendly and sustainable products for many years and this trend is growing very fast region to region. Hence, we see Watersol<sup>®</sup> as a revolutionary product for a balanced environment.

### Features

- Watersol<sup>®</sup> film can be engineered to dissolve at different parameters in water. Solubility can be affected by many factors, including film gauge, water temperature, agitation, water contaminants and compatibility with packaged products.
- Watersol<sup>®</sup> film is an excellent barrier to odours, bacteria, carbon dioxide, nitrogen, hydrogen and oxygen. The film is permeable to moisture and ammonia. This helps it preserve the fragrance of the contents.
- Watersol<sup>®</sup> film is easily heat-sealed and the temperatures depend on the type of films, its moisture content, dwell time and the type of heat-sealing equipment used.
- Watersol<sup>®</sup> film is resistant to vegetable, mineral and other oils. It is also resistant to fats, organic solvents and hydrocarbons.

# INDUSTRY APPLICATIONS OF Watersol®



Watersol® film is mostly used as a packaging material for speciality packaging applications and as a backing sheet in the embroidery industry due to its water soluble and biodegradable nature. This is an eco-friendly innovation that helps the consumer with precise (unit) dosing of products with safe handling and storage of toxic or hazardous products.

This film can be used to pack manually as well as having excellent machinability characteristics, thereby enabling it to be run on machines such as Vertical Form Fill Sealing (VFFS), Horizontal Form Fill Sealing (HFFS), Flow Wrap packaging machines and Thermoforming machines.



## AGRO CHEMICALS

Watersol® film is used in packing hazardous pesticides, insecticides, adjuvants and other crop secure products in portion packs/unit dosage of water soluble bags. This eliminates the uncertainty over the correct dosage to be used by the farmers. The sachet, containing pre-measured quantities, simply needs to be put in water which gets dissolved and becomes ready for final application on the crops.

The biggest challenge in the agrochemical industry is the use and disposal of pesticides and its containers. The other concern is to deliver an optimal quantity of chemicals at a precise location through knapsacks. Water Soluble film for Agrochemicals are the ideal and non-negotiable solution to resolve these very important concerns and possible threats to the industry.

It is also being made mandatory by W.H.O for certain highly toxic chemicals to be packed only in water soluble sachets thereby reducing danger to human life.



## CEMENT ADDITIVES / DYE / ENZYME

Cement additives/dyes/enzymes are alkali, acidic and neutral in nature. These can be packed in Watersol® film to avoid any hazardous impact on the environment and living beings.

By using Watersol® film, the mixing operations have become simple and the additive measures are more precise.



## FISH BAIT

By using Watersol® bags instead of a traditional net bags to pack bait and hook for deep water fishing, Watersol® bag mostly avoid interference by fishing in shallow water areas and diminishes before reaching deep water areas.



## LIQUID DETERGENTS

This application hinges on the principle of using Watersol® film packaging to deliver sealed unit dosage amounts of liquid detergent products without leakage via pinholes. Watersol® film is formulated in such a manner to make it compatible with liquid detergent for purposes of packaging, shipping, storage and usage.



## SEED TAPE

Using Watersol® film for seed tape ensures precision seed planting with less effort and less waste of seeds. Seeds planted using this method prevent the seeds from being blown away by the wind and being eaten by the animals, and also keep the moisture intact in the soil.



## POWDER DETERGENTS

Watersol® film is ideal for powdered detergent pouches (and solid detergent blocks) which usually contain powdered ingredients that effectively dissolve in water. Our Watersol® film is manufactured with high-quality standards, this helps in avoiding pinholes and sealing problems which may sometimes be experienced while packaging powder detergents.



## TOILET BLOCKS

Watersol® film can be used to pack all toilet blocks which help in storing the toilet cleaning detergents safely in hospitals, hotels and in individual homes, caravans and mobile homes - thereby ensuring that toilets remain germ-free, and smell clean.

## EMBROIDERY



In embroidery, Watersol® with its controlled tensile strength enables the needle to penetrate, puncture and come out faster. The film serves embroidery topping, stabilising and backing application and tears like paper, saving time. The excess film after embroidery can be torn off easily. The remaining film can be dissolved, with either water spray or dampening with a warm sponge. Other non-wash solutions, such as paper, leave residual fibres and may often contain formaldehyde.

Watersol® is the ideal stabiliser when sewing fine fabrics, like silk and organza, as Arrow's Wash Away Water Soluble Stabilizer prevents any displacement of the fabric. Watersol® Wash Away Stabilizer film runs smoothly on mono and multi-head embroidery machine and ideal for manual embroidery as well. This improves the needle strength with no residue at the end.

## HYGIENE AND HEALTHCARE



Laundry Bags made of Watersol®:- Watersol® made Water soluble laundry bags are an effective handling system in healthcare and hygiene industry citing the critical infection control and safety standards. Arrow's Water Soluble Laundry Bags isolate the infected / contaminated from the point of filling or usage and also from human contact.

Our Watersol® Strip and Dissolve Away bags come in various colours, thickness and sizes catering to the precise requirements of the healthcare industry.

## MOULD RELEASE AND 3D PRINTING



Watersol<sup>®</sup> mould release film is separated easily from hydrophobic plastic and released easily from various organic materials that have a little polarity. As a dry film, PVA is resistant to the solvents in a resin system but is water soluble. Watersol<sup>®</sup> film acts as mould release agent for the unsaturated polyester epoxy resin or other thermosetting resin. This film forms a barrier between parts and mould surfaces that are still curing. The exciting new 3-D printing industry can benefit from using variations of the Watersol<sup>®</sup> dry film as a stabilizer on which to print an extension (where there may be no other support) – and then the film may be easily washed away after the design is printed.

## WATER TRANSFER PRINTING



This unique technology offers quality decoration of a wide range of products, whether made from plastic, wood, ceramic, metal or composite material. Any three-dimensional objects can be printed on, ranging from small switches to as large an object as a car. Water Transfer Printing is a decoration technology that uses a specialised Watersol<sup>®</sup> film that is printed with a range of natural and abstract patterns to decorate complex-shaped plastics, metals and other material. The specialised film is floated on the water surface and the pattern is transferred by the use of activator on the three-dimensional object used for printing.



# PRODUCT GRADES AND SPECIFICATIONS

## Watersol<sup>®</sup> film (Arrow's PVA / PVOH Film) Grades

Grade/ Series	Properties	Thickness Range (in Microns)	Common Applications / Industrial Use
AN Series Plain/Embossed	Available in Plain & Embossed form Heat sealable, Excellent machinability, good compatibility on Vertical Form Fill Sealing, Horizontal Form Fill Sealing machine, Flow Wrap Packaging Machine. Excellent for security embedding and print Cold Crack Resistance, high slip properties.	25-80	Packaging of Agro-Chemicals, Detergents, Deodorizer, Dyes, Dyes Bags Pigment, Weed Killer, Use in Water Soluble Tape, Self-Destructive Irreversible Packaging, High Security Film, Fish Baits, Gas Welding, Concrete Fibers, Perfumed film, Flow Wrap Film and unit Packs.
AE Series Embossed	Embroidery topping & backing film with Low Strength, Medium Strength Film, High Strength and Tensile Properties with Good Solubility, Specially designed for Mono & Multi head Embroidery Machine	25-80	Embossed Embroidery film typically used in embroidery production in Mono and Multi Head Embroidery Machines, Also ideal for hand embroidery.
AA Series Plain/Embossed	Embossed Film, Non-Sticky, Heat Sealable, Cold water soluble, Optimum machine Run-ability on horizontal and Vertical Form Fill Seal Machines	25-80	Packaging of Agro-Chemicals, Detergents, Deodorizer, Dyes, Dyes Bags Pigment, Weed Killers. Self-Destructive Irreversible Packaging, Fish Baits, Concrete Fibers, Perfumed film, Film for Toilet Blocks and unit Packs.
AS Series Plain/Embossed	Soap Film- Specially designed for packaging of soaps, Customized Film, available in different fragrance, colour, shape and size	30-60	Typically used in packaging of Soap Strips, Shampoo Strips, Face Wash strips and other soap related products
AD Series Plain/Embossed	Slow Dissolving Plain, Printed, Security Film Alkaline Resistant, Specially designed for solid and liquid Detergents, Ideal run-ability on Thermoforming machines	35-75	Unit Packaging, Detergents Packaging, Liquid Detergent Packaging, Agrochemicals, Dye and Pigment Packaging.
AH Series Plain/Embossed	Slow/ Hot Water Soluble Plain, Printed Film Specially designed for Laundry Bags, Mould Release and Dung Bags, Soluble in Hot Water	35, 50, 70	Mould Release, Laundry Bag, Sanitary Napkins and Dung Bag.

## Specifications

Packaging	Usually packed around a 3 inch (76 mm) paper core, also available in custom cores. Packed appropriately as per international standards.			
Sealing	Watersol® Films are Heat Sealable and sealing depends on the thickness of film, temperature, moisture content and sealer type.			
	<b>Relative Humidity (%RH)</b>	55%RH	65%RH	80%RH
	<b>Moisture Content (%)</b>	5-7%	8-10%	12-15%
	<b>Sealing Temperature(°C)</b>	170 <sup>0</sup> - 220 <sup>0</sup> C	160 <sup>0</sup> - 180 <sup>0</sup> C	150- 170 <sup>0</sup> C
Length	Rolls of 200, 500, 1000 meter length *Available in all custom dimensions			
Width	50-1500 mm *Available in all custom dimensions			
Appearance	Colourless, Coloured, Semi-transparent, Embossed (textured), Plain and Printed films available. Our plain films looks transparent to semi transparent			
Moisture Content	Controlled moisture and packed in water proof outer packaging, however when film is taken out from package the moisture content changes by humidity and outside temperature .			
Solubility	Range for cold water soluble film	1 <sup>0</sup> C – 35 <sup>0</sup> C		
	Range for hot water soluble film	55 <sup>0</sup> C- 95 <sup>0</sup> C		
*As per IS 16154:2014				
Packaging, Storage & Precautions	Avoid extreme humidity and temperature when using and storing Watersol® film. Ideally to be stored in controlled atmosphere of humidity 50-55% RH and temperature 20-27 <sup>0</sup> C.			
Decomposition	Watersol® film degrades under specific conditions. The degradation process produces only carbon dioxide and water.			

# Watersol®



## Our Key Clients

- Adama
- BR Agrotech
- Cheminova
- Chemisol
- Coromandel International
- Crop Care Pesticides
- Crystal Crop Protection
- D Decor Exports
- Indogulf Crop Sciences
- Roha Dyechem (Thailand)
- Tagros Chemicals
- UPL Limited
- Syngenta

## Manufacturing Unit



## Arrow Greentech Ltd.

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