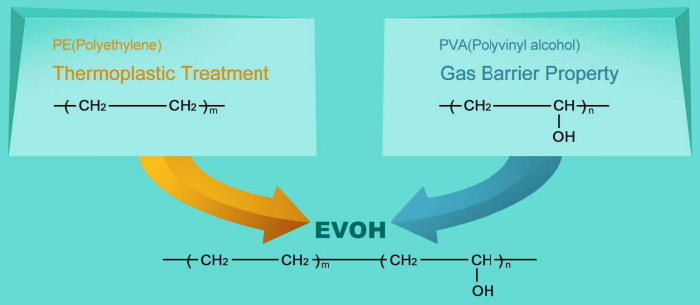
GENERAL INFORMATION

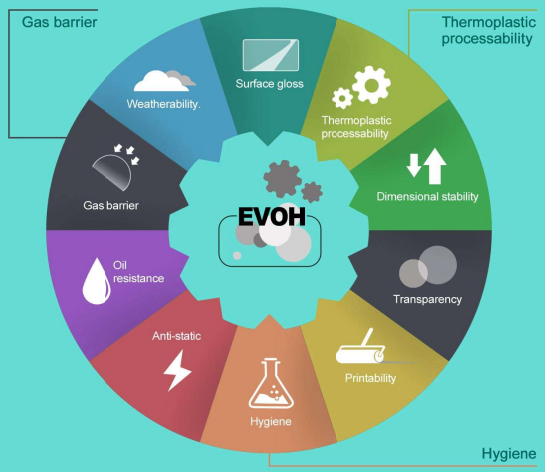
1. SVW EVOH Product Introduction

SVW ethylene-vinyl alcohol resin EW series product is a thermoplastic barrier resin independently developed by its own technology. EW series product combines high barrier property of PVA resin and heat resistance and melt processing properties of PE resin. It is widely used in packaging materials for food, pharmaceuticals and toxic volatile substance to greatly extent the food shelf life in the absence of preservatives, as well as reduce the volatilization of harmful substances. It also can be used in various fields such as underfloor heating pipe, oil pipeline, automotive fuel tank and etc..

Molecular structure:



2.Product Properties

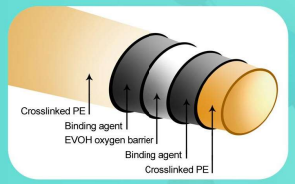


Gas Barrier Property

SVW EW series product, combining the processability of PE and the gas barrier property of PVA, is a high performance barrier material with oxygen transmission rate (OTR) 10 thousand times that of PE.

Polymer resin	OTR（20℃，65%RH）
EW-3201	0.4
EW-3801	1.0
PVDC copolymer	2.6
Nylon	38.0
PET	54.0
HDPE	2300.0
C-PP	3000.0
PC	5000.0
LDPE	10000.0
EVA	18000.0

Unit: ml*20μm /m²*per day*bar



EW series product is widely used in food packaging materials to preserve the flavor and active ingredients of foods and block out external odors. It can also be used for packaging of pharmaceuticals and cosmetics to avoid deterioration.

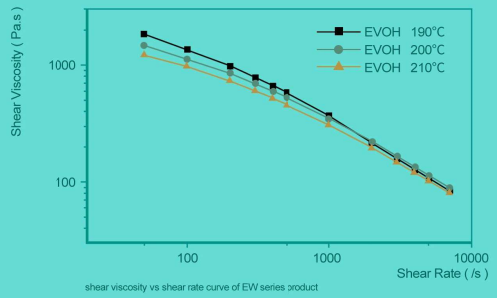
Thermoplastic Processability

SVW EW series product is applied to monolayer or multilayer film extrusion, sheet and profile co-extrusion, co-extrusion blow molding, co-extrusion coating, lamination (or stack) and injection molding. Furthermore, the secondary processing processes containing the skeleton or film of EVOH resin, such as thermoforming, vacuum molding and printing, are easily made.

melt extrusion molding

melt blown molding

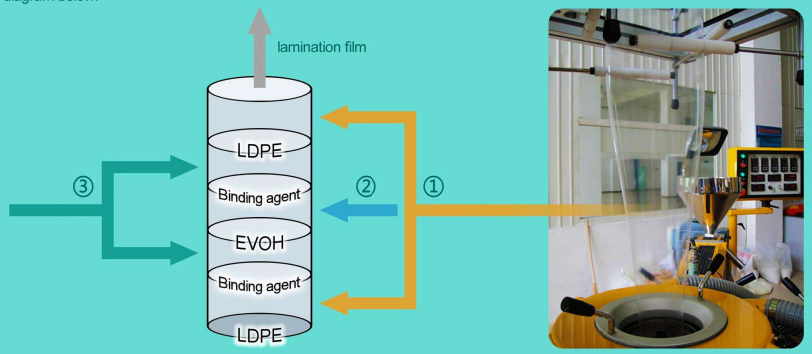
The change law for shear viscosity versus shear rate of EW series product is in conformity with polymer rheological property, fully meeting the techrical conditions for melt processing.



shear viscosity vs shear rate curve of EW series product

Processing condition example for 5-layer co-extrusion blown film of EW series product:
Equipment items: 5-layer co-extrusion blown film machine train, consisting of 3 identical single screw extruders, die head of multilayer blown film and film winding machine.
Screw: diameter 30mm (hybrid screw) LD ratio: 30 Compression ratio: 3:1 Die gap: 80mm

LDPE is fed into the first and fifth layer by single screw extruder ①, EW product is fed into the middle layer by single screw extruder ②, and binding agent is fed into the second and fourth layer by single screw extruder ③, die head is shown in the schematic diagram below:



Production Process Parameters

Single Screw Extruder	Temperature /°C					Speed/rpm	Die Head Temperature /°C
	Section No.1	Section No.2	Section No.3	Section No.4	Section No.5		
①	180	220	225	225	225	160	238
②	180	240	240	235	230	24	
③	170	225	225	225	240	32	

Test Results of Blown Film

Test Institute	Test Item	Test Standard	Test Results	
			EW-3201	EW-3801
National Quality Supervision & Inspection Center for Packaging Material	oxygen transmission rate $cm^3/(m^2 \cdot 24h \cdot 0.1MPa)$	GB/T1038-2000	0.4	1
	vapor transmission rateg/$(m^2 \cdot 24h)$	GB/T1037-1988	2.8	2.7

Hygiene
SVW EW series product contains no heavy metals and other hazardous substances, composed of carbon, hydrogen and oxygen only, which fails to generate toxic gases upon combustion, moreover, as its combustion heat is only half that of ethylene, it is regarded as green and environmentally-friendly packaging material.

3.Product Specification

Item	Specification		Test Standard
	EW-3201	EW-3801	
Melt Index* (g/10min)	1.5-2.5	1.5-2.5	GB/T3682-2000
Chroma ≤	20	20	
Volatiles (w%)≤	0.3	0.3	ISO14663-2
Ethylene Content (mol%)	30.0-34.0	36.0-40.0	ISO14663-2
Density (g/cm^3)	1.10-1.20	1.10-1.20	GB/T4472-2011

*190°C, 2160g

APPLICATION

1.Application Fields

Barrier packaging material: EVOH resin EW series product is widely used in barrier packaging materials for food, pharmaceuticals, detergents & cosmetics due to its excellent oxygen barrier and thermoplastic processability.

Film

Processing Method	Structure (out /in)	Packaging Material Properties	Applications
T-type die head casting method or blown film co-extrusion	PA/EW/EVA LLDPE/Tie/EW/EVA PP/Tie/EW/Tie/PP	Gas barrier, transparency, tear strength and puncture resistance	Raw meat, ham, sausage, processed fish products, etc.
Co-extrusion and lamination	PA/EW/PA/LDPE	Gas barrier, tear strength and puncture resistance	Vacuum packaging

Plastic Bottle & Case

Processing Method	Structure(out/in)	Packaging Material Properties	Applications
Co-extrusion blow molding	PP/Tie/EW/Tie/PP HDPE/Tie/EW/Tie/HDPE LDPE/Tie/EW/Tie/LDPE PET/EW/PET	Gas barrier, oil resistance, transparency, solvent resistance, high tenacity	Juice, tomato sauce, sodas, industrial chemicals, gasoline
Co-extrusion sheets	PP/Tie/EW/Tie/PP HDPE/Tie/EW/Tie/HDPE PET/EW/Tie/PP	Gas barrier, flavor preservation, high tenacity	Jelly, cream,raw meat, sausage, etc

Pipe

Processing Method	Structure(out-in)	Packaging Material Properties	Applications
multilayer pipe co-extrusion	LDPE/Tie/EW/Tie/LDPE LLDPE/Tie/EW/Tie/LLDPE	Flavor preservation, extrudability, organic solvent resistance	Cosmetics, tooth paste, underfloor heating pipes

Co-extrusion lamination film: used for packaging of raw meat, ham and fish products and etc.



Co-extrusion sheet package: used for packaging of tomato sauce, yoghourt, jelly, jam and etc.



Co-extrusion sheet package: used for packaging of cosmetics, pharmaceuticals, industrial chemicals, daily chemical products and etc.



Automobile fuel tank: EW series product is an ideal material for the manufacture of container such as automobile fuel tank due to its excellent oil resistance and solvent barrier properties.


Underfloor heating pipe: EW series product can be used for underfloor heating pipe to create a cozy living space due to its excellent anti-aging and gas barrier properties.


2.Recommended Lamination Material

Material Type	PTFE	PE	PP	SBR	NR	BR	PS	PVAc	PVC	PET	EP	POM	PA	PAN	EW
Solubility	6.2	8	7.9	8.1-8.5	8.1	8.5	8.5-9.6	9.4	9.6	10.7	11	11.1	13.5	15.4	19

As the significant solubility difference between EW series product and most olefin-based polymers causes their incompatibility, the binding layer is necessary. However, no binding layer between EW series product and PA /PAN is needed.

3.Processing Precautions

Cleaning before feeding:

LDPE can be directly switched to SVW EW series product, however, if switched to SVW EW from PA, PVC, HDPE, PP, L-LDPE and etc., LDPE must be used to completely replace the residual resin in the cylinder and die head before feeding SVW EW into the system.

Resin temperature:

Attention shall be paid to the temperature settings of the cylinder and die head which shall not exceed 240°C and the screw speed shall be well-controlled.

Residence time:

If the production has been interrupted for more than 30 minutes, keep the screw running at low speed, or use LDPE for replacement.

Shut down cleaning:

LDPE is recommended for replacement and cleaning.

PACKAGING, STORAGE AND TRANSPORT

1.Packaging

The product is packed with multilayer aluminum-plastic vacuum bag, with option of the customized packaging specification and net weight.

2.Storage

The product shall be stored in dry and ventilated locations, far away from heater or heating source, and protected against damp, rain and sunlight.

3.Transport

The product is nonhazardous, package damage by scratch or throwing shall be avoided during loading and unloading. Any accidental spill of the product shall be cleaned to avoid slip. During the transport, precautions against damp, rain and sunlight shall be taken.

PRODUCT SAFETY DATA

1.Product Composition

Chemical product	granular polymer
Chemical name	ethylene-vinyl alcohol copolymer
Molecular formula	$(CH_2\text{-}CH_2)_m\text{-}(CH_2\text{-}CH)_n$ (OH)
Other components	free of hazardous substance

2.First Aid Measures

Eye contact	Immediately rinse with plenty of water if fine product powder gets into the eye.
Skin contact	Skin contact with resin under normal temperature is harmless. In case of skin contact with molten resin, rinse with plenty of cold water till the resin cooled down, cover the burned skin with clean gauze and get medical attention immediately. Do not attempt to peel off or remove the contaminated clothes from the skin.
Inhalation	In case of inhalation of smog from the heated product, or excessive exposure to fine powder, immediately move the victim to fresh air. In case of cessation of breathing, conduct artificial respiration and get medical attention immediately.
Ingestion	If swallowed, get medical attention immediately and provide physician with the package and label of the product. Rinse mouth with water and give the victim one or two glasses of water to drink.

3.Fire Fighting Measures

Special hazards	Carbon monoxide (CO) and irritating smog will be generated under anoxic conditions
Extinguishing media	Dry chemicals, water and carbon dioxide
Preventive measure	Self-contained breathing apparatus

4. Personal Protection

Engineering measures	Provide local ventilation to avoid buildup of dust and smog and install emergency shower and eye washer in the workplace.
Respiratory protection	Wear appropriate respiratory equipment where exposure may exceed the acceptable threshold.
Eye protection	Wear safety goggles if there is possibility to contact with the hot or molten resin.
Hand/Skin Protection	Wear heat protective gloves and clothing if there is possibility to contact with the hot or molten material.

5.Physicochemical Properties

Appearance	cylinder or round granule
Color	white, transparent or semitransparent
Melting point	140~200°C
Density	1.10~1.22
Decomposition temperature	>300°C
Solubility in water	insoluble in water
Solubility (others)	soluble in dimethyl sulfoxide

6. Stability and Reactivity

Stability	very stable
Conditions to avoid	continuous heating above 250°C

7. Waste Disposal Considerations

Waste disposal	Dispose the waste in accordance with local regulations