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RUICHUANG
睿创

Protection Wrap Film Product Specification

I. Product Description

Protection Wrap Film, also known as Color PPF, utilizes thermoplastic polyurethane (TPU) as its base material, infused with chromatic materials. Manufactured through coating and laminating processes, it achieves dynamic color-shifting properties while maintaining high elasticity, abrasion resistance, and weather-ability. The film features exceptional scratch/scrape resistance, oxidation resistance, and self-healing capabilities. It delivers superior color saturation and gloss compared to conventional films and finds extensive applications across diverse industries. This product integrates color transformation with paint protection film (PPF) functionality innovatively.

II. Key Features

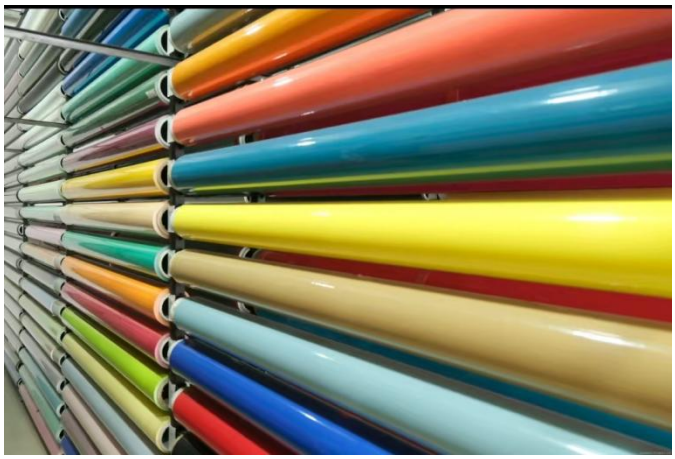
High Toughness & Abrasion Resistance: The TPU material offers superior tensile strength and tear resistance, effectively shielding surfaces from physical damage like everyday scrapes and road debris impact.
Self-Healing Properties: A specialized surface coating incorporates elastic memory polymers. Minor surface scratches self-repair through molecular realignment when exposed to moderate heat (e.g., sunlight or warm water).
Premium Color Performance: Available in a wide spectrum of colors with options for custom color matching to meet specific client requirements.

III. Applications

This versatile film is engineered for use across multiple sectors, including:

Automotive Industry (Vehicle wraps, PPF, decorative trim)
Consumer Electronics & Wearable Tech (Device casings, protective covers)
Architectural & Design Surfaces (Interior/exterior accents, signage)
Industrial Packaging & Specialty Surfaces

IV. Product Image



V. Product Typical Structure

The typical structure of a finished color-change film includes: protective film, coating layer, TPU transparent film, colored polyurethane layer, polyurethane layer, pressure-sensitive adhesive, and release liner.

Protective Film/保护膜（50u Self-developed）
Coating Layer/涂层（7u）
TPU Transparent film/TPU 透明膜（115u）
Colored Polyurethane Coating/聚氨酯色层（20u Self-developed）
Polyurethane Substrate/聚氨酯底层(20u Self-developed)
Pressure-sensitive Adhesive/压敏胶（28u）
Liner/离型膜(75u)

VI. Technical Standards

- **Appearance Standards**

Item	Standard		Testing Method
Protective film bubbles	Visually undetectable		Visual inspection
Protective film dirt spots	Visually undetectable		Visual inspection
Fisheye,bumps	0.1-0.6mm	Uncountable	Visual inspection
	0.7-2.9mm	Less than 20 spots	
	≥3.0mm	1 spot is allowed	
Coating streaks	Visually undetectable		Visual inspection
Adhesive lines	Visually undetectable		Visual inspection

Testing Method Description:

1. Coating streaks are evaluated by removing the HD protective film and visually inspecting the sample surface.
2. Fisheye and bump spots are measured in the most dense area within a 12.7cm x 12.7cm range.

- **Physical Indicators**

Item	Value	Testing Method
Gloss (60°)	≥90(gu)	GB 8807
Finished product weight	355~395(g/m²)	GB/T 4669
Adhesive weight	25~30(g/m²)	
Protective film thickness	45~55(μm)	GB/T7125
TPU&HC thickness	140~190(μm)	
PET liner thickness	75~85(μm)	
Elongation at break(HC)	≥60%	GB/T 1040.1
Dimensional stability(MD)	≤0.5(mm)	FTM 14
Dimensional stability(CD)	≤0.4(mm)	
Release force	≤0.3(N/25 mm)	GB/T 2792
Adhesion Strength(initial)	≥8(N/25 mm)	FTM 9
Peel Strength (24h,180°)	≥12(N/25 mm)	GB/T 2792
Peel Strength (storage aging)	≥10(N/25 mm)	GB/T 2792
Peel Strength (in-use aging)	≥16(N/25 mm)	

Testing Method Description:

HC Protective Film Elongation at Break: Refers to the elongation value recorded when the HC coating fractures during tensile testing of the finished product, conducted in accordance with *GB/T 1040.1 Plastics—Determination of tensile properties—Part 1: General principles*.

Aged Peel Strength (Storage Condition): Indicates the 180° peel strength measured per *GB/T 2792* after the sample undergoes 65°C/72h aging treatment.

Aged Peel Strength (Application Condition): Indicates the 180° peel strength tested after the adhered sample undergoes 65°C/72h aging treatment and subsequent cooling to ambient temperature.

- **Functional Data**

Item	Value	Testing Method
Scratch Self-healing	Self-healable upon heating	0.1mm copper brush,heat gun
Water contact angle	≥103°	Reference DL/T864 AppendixA
Acid/alkali resistance	No visible defects on coating	Direct Experiment
Yellowing(△E)	≤2	QUV Method
Stain resistance	No visible water spots	Exposure in Rain

Testing Method Description:

Self-healing Performance: After performing 10 circular scrubbing cycles on the coating surface using a brass brush with wire diameter ≤0.1mm, visually inspect the disappearance of fine scratches after heating with a heat gun or 100 °C boiling water.

Acid/Alkali Resistance: Apply 10 vol% hydrochloric acid and 0.1 mol/L sodium hydroxide solution to the sample surface. After natural exposure for 24 hours, evaluate the sample for absence of visually detectable coating defects (e.g., bubbles, cracks).

Stain Resistance: Subject the sample to accelerated degradation using equipment with UV radiation, heating, and spraying functions. Parameter settings shall comply with relevant provisions of GB/T 16422.2, with general industrial water used for spraying.

VII. Packaging Standards

Packaging Materials:

Item	Material
Packing Materials	3-inch plastic inner core tube/double-sided tape /red tape
	PE plastic bag/warranty card /packaging carton(white lid&black lid)
	Wooden pallet /packing bag /stretch film /product information sheet

Packaging Specification:

Item	Material
Roll Length	14.5~15.1m
RollWidth	1.515~1.525m
Packaging Method	Box & Pallet

Please Note:The packaging methods and corresponding materials listed are standard specifications only. For special or additional requirements, the actual shipment shall prevail.

VIII.Storage Conditions

Condition	Value
Temperature	15-25 (℃)
Humidity	45-50 (%)

Instructions:

- All protection wrap films must be stored in their original packaging using the protective materials supplied with the raw materials.
- Hermetic storage with vertical stacking is recommended as the optimal solution. Avoid direct sunlight exposure and contact with heat sources.
- After unpacking, residual materials must have their high-definition protective film layers promptly removed to prevent storage defects such as edge warping and surface blushing.
- Strict adherence to warehouse temperature and humidity control requirements is essential for maintaining product performance and effectively preventing environmental degradation.

IX. Installation Conditions

Condition	Value
Temperature	15-25 (℃)
Humidity	45-50 (%)
Cleanliness:	Free from visible dust or suspended particles

Instructions:

- All protection wrap films must undergo die-cutting or plotting operations in controlled environments to prevent adverse temperature and electrostatic conditions from compromising product appearance and performance.
- Strict surface preparation of automotive paint must be performed prior to installation, eliminating residual particles and oil contaminants that may cause application defects.
- Car washing must be avoided for one week post-installation, and prolonged rainwater exposure prevented, ensuring optimal wetting of the adhesive to achieve maximum bond strength.

X.Durability & Warranty

Item	Value
Outdoor Durability	3 years
Warranty Coverage	substrate cracking, coating delamination, adhesive layer bubbling

Instructions:

- The weatherability of all protection wrap films must meet specified storage conditions and standardized installation procedures throughout their service life.
- For defects covered by the warranty, strict adherence to product use and maintenance protocols is mandatory. Detailed specifications are provided on the pack-in identification card and official statement included with the product.