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PE Heat Shrink Film — Product Profile & Technical Data

PE 热收缩膜 产品介绍与技术参数

Bilingual edition · 中英双语版 · For customer evaluation and packaging line selection · 供客户评估与包装线选型使用
Doc. No. 编号：API-TDS-PE-20261110 · Rev. 版本：1.0 · Date 日期：2026-11-10 · Product 产品：PE shrink film / PE 热收缩膜

1. Product Overview / 产品概述

PE heat shrink film is a polyethylene packaging film that has been oriented during manufacture and therefore keeps a “ shrink memory ”. When it passes through a shrink tunnel, the oriented molecular chains relax and the film contracts around the load, forming a tight, unitised pack that is dust-proof, moisture-resistant and difficult to tamper with. The film is produced by blown film extrusion from LDPE as the base resin, blended with LLDPE — including metallocene LLDPE — together with slip, anti-block and antioxidant additives. Multilayer co-extrusion (3 or 5 layers) separates the sealing skins from a tougher core, balancing sealability, shrink force and puncture resistance.

PE 热收缩膜是以聚乙烯为基材、在成膜过程中经过定向拉伸而保留“ 收缩记忆 ”的包装薄膜。通过收缩炉时，被拉伸的分子链解取向，薄膜受热回缩并紧贴被包物，形成防尘、防潮、难以拆动的整体包装。生产上以 LDPE 为基础树脂，与 LLDPE（含茂金属 LLDPE）及爽滑、抗粘连、抗氧等助剂共混后吹塑成膜；三层或五层共挤可把热封表层与强韧芯层分开，兼顾封口性、收缩力与抗穿刺性。

Shrink behaviour is directional. GB/T 13519-2016 classifies these films into transverse-shrink film (palletised loads, cartons) and longitudinal-shrink film (single or grouped fixed-shape products). Biaxially oriented grades shrink in both MD and TD and follow irregular shapes more closely.

收缩具有方向性。GB/T 13519-2016
将这类薄膜分为横向收缩膜与纵向收缩膜。双向拉伸牌号在纵向（MD）与横向（TD）同时收缩，更贴合异形产品。

1.1 Key advantages / 主要优势

- High tensile strength and puncture resistance — fewer failures on sharp corners and pallet edges. 拉伸强度与抗穿刺性高，锐角与托盘边缘不易破膜。
- Tough at low temperature — remains flexible at about − 50 °C, suitable for cold-store and winter transport. 低温韧性好，约 − 50 °C 仍保持柔韧。
- High shrink force holds pallet loads and irregular shapes firmly. 收缩力大，托盘货物与异形产品束缚牢固。
- Good moisture barrier, dust/water protection, chemical resistance. 阻湿、防尘防水，耐一般化学品。
- Chlorine-free polyethylene, recyclable in the PE (resin code 4) stream. 不含氯，属 PE（回收标识 4）体系，可回收。
- Lower material and storage cost than cartons; flat rolls save warehouse space. 相较纸箱可降低材料与仓储成本。
- Printable after double-side corona treatment; available as tube, sheet, centre-fold or bags. 双面电晕后可印刷；可做筒膜、片膜、对折膜或袋型。
- Compatible with manual, semi-automatic and high-speed automatic lines. 适配手工、半自动与高速自动包装线。

1.2 Typical applications / 典型应用

- Beverage bottle multi-packs, cans and PET bottle trays 饮料瓶组、罐装、PET 瓶托盘集合包装
- Carton bundling and case overwrapping 纸箱集合捆包与整箱裹包
- Building materials, profiles, tiles and timber 建材、型材、瓷砖与木材
- Home appliances and electronic enclosures 家电与电子设备外壳
- Pallet hoods and full-load shrouds 托盘罩膜与整垛罩包
- Furniture, hardware and irregular industrial parts 家具、五金与异形工业件
- Paper rolls, textiles and bagged chemicals 纸卷、纺织品与袋装化工品
- Storage and export protection against rain and dust 仓储与出口运输的防雨防尘保护

2. Product Range & Construction / 产品系列与结构

Item 项目	Options / description 可选形式与说明
Resin system 树脂体系	LDPE base blended with LLDPE or metallocene LLDPE; additives for slip, anti-block, antioxidant and UV where required. LDPE 为基础，与 LLDPE 或茂金属 LLDPE 共混；按需加入爽滑、抗粘连、抗氧及抗紫外线助剂。
Layer structure 层结构	Single layer, 3-layer or 5-layer co-extrusion. Skin layers control sealing and optics; the core carries strength and shrink force. 单层、三层或五层共挤。表层控制热封与光学性能，芯层提供强度与收缩力。
Shrink direction 收缩方向	Transverse-shrink (TD-dominant), longitudinal-shrink (MD-dominant) or balanced biaxial, per GB/T 13519-2016. 横向/纵向收缩或双向平衡，对应 GB/T 13519-2016 分类。
Supply form 供货形态	Tubular roll (layflat), single-wound sheet, centre-folded roll or pre-made bags. 筒膜卷、单片卷膜、对折卷膜或成品袋。
Surface treatment 表面处理	Double-side corona, normally ≥38 dyn/cm; one-side or untreated on request. 双面电晕，通常 ≥38 dyn/cm；可按需单面或不处理。
Colour & printing 颜色与印刷	Transparent, translucent white, or tinted; up to 8-colour flexo or gravure on treated film. 透明、雾状白或着色；处理面最多 8 色柔印或凹印。
Food-contact grade 食品接触级	Available on request, confirmed against GB 4806.7 / EU 10-2011 / FDA before ordering. 按需提供，订购前须按相关标准确认。

Unit notes 单位说明: 1 mm = 1000 μm; 1 mil = 25.4 μm; 1 dyn/cm = 1 mN/m. “Layflat width” is the flattened width of a tube; open circumference = 2 × layflat width. 折径指筒膜压平后的宽度，展开周长为其两倍。

3. Technical Parameters / 技术参数

Tested to GB/T 13519-2016. Values below are typical for the specifications we can supply; batch data on request. The supply specification is fixed in the technical confirmation sheet signed with the order. 本产品按 GB/T 13519-2016 检验；下列为可供货规格典型值，正式供货规格以随订单签署的技术确认单为准。

3.1 Dimensions & roll build / 尺寸与卷材

Property 项目	Unit 单位	Typical value 典型值	Method 方法	Remark 说明
Thickness 厚度	mm	0.015 – 0.30; normal 0.03 – 0.25	GB/T 6672	偏差按 GB/T 13519 表 3
Width, single-wound 幅宽	mm	100 – 6000; wider on request	GB/T 6673	宽度偏差 ±5~±35 mm
Layflat width 折径	mm	400 – 4200 typical	GB/T 6673	展开周长 = 2 × 折径
Core inner dia. 纸芯内径	mm	76 (3 inch) standard	Measured 实测	其他规格可协商
Roll weight 卷重	kg	15 – 30 per roll common	Weighed 称重	受搬运与托盘限制
Length per roll 每卷长	m	L = M ÷ (W × t × ρ)	Calculated 换算	W:m, t:mm, ρ:g/cm³, M:kg

3.2 Physical & mechanical / 物理与力学性能

Property 项目	Unit 单位	Typical value 典型值	Method 方法	Remark 说明
Density 密度	g/cm³	0.92 – 0.93	GB/T 1033.1	随树脂与共混比例
Tensile MD 拉伸 纵	MPa	≥20; typical 24.14	GB/T 1040.3	Ⅱ型试样
Tensile TD 拉伸 横	MPa	≥18; typical 25.36	GB/T 1040.3	同上
Elongation MD 伸长 纵	%	≥200; typical 388	GB/T 1040.3	高伸长=韧性好
Elongation TD 伸长 横	%	≥200; typical 500	GB/T 1040.3	同上
Right-angle tear 直角撕裂	kN/m	≥40	QB/T 1130	纵横向分别报告
Wet tension 湿润张力	dyn/cm	≥38 after corona	GB/T 14216	双面；印前复检

3.3 Shrink performance / 热收缩性能

Property 项目	Unit 单位	Typical value 典型值	Method 方法	Remark 说明
Shrinkage MD 收缩 纵	%	30 – 70; common 50 – 70; typ 64.3	GB/T 13519 6.3	120±2°C, 20 s
Shrinkage TD 收缩 横	%	20 – 55; typical 39.5	GB/T 13519 6.3	同批试样
Shrink onset 起始温度	°C	approx. 110 – 120	Data sheet	低于此仅软化
Tunnel temp. 炉温	°C	140 – 180 common; 180 – 220 thick	Line trial	适用 120 – 220°C
Shrink force 收缩应力	N/mm²	grade-dependent	ISO 14616	决定束紧力

3.4 Optical & appearance / 光学与外观

Property 项目	Unit 单位	Typical value 典型值	Method 方法	Remark 说明
Haze 雾度	%	grade-dependent	GB/T 2410	PE 通常高于 POF，须实测
Light transmittance 透光率	%	grade-dependent	GB/T 2410	按订单实测
Gloss (45°) 光泽	GU	grade-dependent	ASTM D2457	须注明角度
Appearance 外观	—	no bubbles/holes/streaks/creases	GB/T 13519 4.1	平铺目测

4. Typical Test Data — High-Strength PE Shrink Film / 高强度 PE 热收缩膜典型实测数据

Typical test data for our high-strength PE shrink film series; normal batch variation allowed. 本系列高强度 PE 热收缩膜典型实测数据，批量之间允许合理波动。

Test item 检验项目	Unit 单位	Result 结果	Remark 说明
Surface 外观	—	Inspected per batch 按批次检验	—
Width 宽度	mm	500 – 5030	片膜与筒膜综合
Thickness 厚度	mm	0.085 – 0.095	约 90 μm 重型规格
Shrinkage MD 收缩 纵	%	64.3	按 GB/T 13519
Shrinkage TD 收缩 横	%	39.5	按 GB/T 13519
Tensile MD 拉伸 纵	MPa	24.14	与重型 PE 相符
Tensile TD 拉伸 横	MPa	25.36	—
Elongation MD 伸长 纵	%	388	—

Test item 检验项目	Unit 单位	Result 结果	Remark 说明
Elongation TD 伸长 横	%	500	—
Wetting tension 湿润张力	dyn/cm	≥38	电晕处理面

5. Comparison: PE vs POF vs PVC vs Plain LDPE / 与 POF、PVC、普通 LDPE 对比

5.1 Material profiles / 材料画像

• PE Heat Shrink Film / PE 热收缩膜 — LDPE + LLDPE blend, mono or 3/5-layer co-extrusion, oriented to retain shrink memory. Highest shrink force & puncture resistance, tough to ~ − 50 °C, lowest cost; lowest clarity, higher tunnel energy. Tunnel 150 – 200 °C. LDPE 与 LLDPE 共混，单层或三/五层共挤后定向。收缩力大、抗穿刺突出、约 − 50 °C 仍韧、成本最低；透明度最弱、收缩温度偏高。常用 0.03 – 0.25 mm。
• POF Heat Shrink Film / POF 热收缩膜 — PE + PP 3/5-layer co-extrusion, biaxially oriented. Best balance: balanced MD/TD shrink, highest clarity/gloss, low temp, food-contact. Costs more than PE, lower shrink force. Tunnel 140 – 160 °C. PE 与 PP 共挤双向拉伸，综合最均衡、透明度最高、适合食品接触；价高于 PE、收缩力较小。12 – 30 μm。
• PVC Heat Shrink Film / PVC 热收缩膜 — PVC + plasticiser + stabiliser, oriented. High clarity, low temp, gentle stress; but chlorine content, limited recycling, cold brittle, regulated in some markets. Tunnel 120 – 180 °C. 含氯、回收受限、低温脆、部分市场受限。15 – 50 μm。
• Plain LDPE Shrink Film / 普通 LDPE 收缩膜 — Single-resin LDPE, low orientation. Soft, cheap, easy to seal, but low shrink/tensile/puncture. Light bundling only. 单一树脂、定向有限；轻载捆扎与一般裹包。0.02 – 0.10 mm。

Property 项目	PE 热收缩膜	POF 热收缩膜	PVC 热收缩膜	普通 LDPE 膜
Density / grammage 密度/克重	0.92 – 0.93 g/cm ^{3} ; 最低	~0.92 – 0.94	~1.30 – 1.40; 最重	~0.92; 轻但弱
Clarity 透明度	中 (低于 POF)	优 (最佳)	优	良
Shrink ratio 热收缩率	50 – 70%, MD-led	60 – 75%, 双向	50 – 70%, 随牌号	低且难控
Shrink temp. 收缩温度	150 – 200°C (高能耗)	140 – 160°C (低)	120 – 180°C (低)	非收缩膜
Tensile 拉伸强度	优 (≥20/≥18 MPa)	良 (低于 PE)	中	中偏低
Tear / puncture 抗撕裂穿刺	优 (耐锐角)	良 (薄规格易破)	中	中偏低
Low-temp 低温性能	优 (~ − 50°C)	良 (~ − 40~ − 50°C)	低 (冷库脆)	良 (强度降)
Food contact 食品接触	可供 (GB4806.7等)	适合直接接触	一般不推荐	可供
Recycling 回收	PE 流 (标识4)	聚烯烃	含氯受限	PE 流
Unit cost 单位成本	最低	中	低+合规成本	低但用膜多

5.4 How to select / 如何选型

Application 场景	Recommendation 推荐	Reason 理由
Beverage bottles / cans 饮料瓶罐	PE; POF for display	收缩力与抗穿刺足，成本最低；需展示用 POF
Cartons 纸箱	PE pallets; POF retail	PE 束紧重垛耐刺破；POF 货架挺括
Building materials 建材型材	PE 80 – 200 μm	厚 PE 耐磨防雨，POF/PVC 过薄
Appliances / heavy pallets 家电重托	PE hood 100 – 250 μm	收缩力与抗冲击固定整垛
Irregular / fragile 异形易损	POF	双向均衡不拉变形
Cold store 低温仓储	PE	~ − 50°C 仍韧；PVC 脆、POF 抗冲降
Export EU/NA 出口欧美	PE or POF; avoid PVC	无氯聚烯烃，回收友好

6. Processing, Storage & Handling / 使用与储运要点

6.1 Shrink tunnel settings / 收缩工艺设定

Parameter 参数	Recommended 推荐做法	Effect / risk 影响与风险
Temperature 温度	140 – 180°C 起，每次 +5°C 至收紧且印面不受影响；厚膜 180 – 220°C	过低松垮狗耳；过高烧膜变形焊口失效
Airflow 风量	上/下/侧均衡，喷嘴通畅	死区收缩不均；单侧风偏载
Uniformity 均匀性	±2°C，开机/换件后记录仪复核	温差致一侧过缩
Line speed 线速	出炉即全缩且不失光；不足先延停留	过短出炉回缩；过长烧边
Cooling 冷却	码垛前留风冷段	热态码垛变形粘连

6.2 Sealing / 封口

Use impulse or constant-heat sealer sized to thickness; verify by peel test (QB/T 2358 / ASTM F88). Seal single layer where possible; keep bar clean and cool seam before tunnel; place seam away from sharp corners. 按膜厚选封口机，试封后按标准剥离验证；尽量单层封口，焊口进炉前冷却，避开锐角。

6.3 Storage & shelf life / 储存与保质期

Dry shaded warehouse 5 – 30 °C, RH <70%, away from heat/sunlight/UV. Keep rolls in original wrap on pallets, not on floor; no point loads; FIFO; shelf life 6 – 12 months; condition 24 h at line temperature in cold weather. 阴凉干燥 5 – 30°C、湿度<70%，卷膜托盘存放不与地接触，先进先出，保质期 6 – 12 个月，冬季回温 24 h。

7. Purchasing Information / 采购信息

7.1 Thickness, grammage and yield / 厚度、克重与出膜量 (ρ = 0.925 g/cm ^{3})

Thickness 厚度 μ m	Grammage 克重 g/m ^{2}	Area/kg m ^{2} /kg	Length/kg @500mm m/kg	Typical duty 典型用途
15	13.9	72.1	144.1	Light bundling 轻载
20	18.5	54.1	108.1	Bottle multi-packs 瓶组
30	27.8	36.0	72.1	Beverage collation 饮料
50	46.3	21.6	43.2	Transit 运输
80	74.0	13.5	27.0	Profiles 型材
100	92.5	10.8	21.6	Pallet loads 托盘
150	138.8	7.2	14.4	Heavy shrouds 罩膜
200	185.0	5.4	10.8	Pallet hoods 罩膜

Worked example 算例: 0.09 mm × 500 mm @ 0.925 g/cm ^{3} = 83.3 g/m ^{2} ; a 25 kg roll ≈ 300 m ^{2} ≈ 600 m at 500 mm. 25 kg 一卷约 300 m ^{2} ，折合 500 mm 宽约 600 m。

7.2 Packing & order / 包装与订货

Core 纸芯 76 mm (3 inch); PE sleeve + woven bag or carton, palletised. Label: grade, width/layflat, thickness, net/gross weight, length, batch, date. MOQ: common industry 1 – 3 t per size, negotiable (indicative, not a quotation). 纸芯 76 mm；PE
套膜加编织袋/纸箱托盘交付。标签含牌号、幅宽/折径、厚度、净重毛重、米数、批号、日期。起订量行业常见单一规格 1 – 3 吨，可协商（参考口径，不构成报价）。

8. Troubleshooting / 常见问题与处理

Symptom 现象	Probable cause 可能原因	Action 处理
Insufficient shrink 收缩不足	炉温低/线速快/风路阻/膜厚/牌号偏低	每次 +5°C、延停留、清喷嘴、核对收缩曲线
Uneven / wrinkles 不均起皱	炉内温差/单侧风/膜厚不均/未居中	测炉温分布、平衡风量、换卷/调位、预成型
Burnt / holed 烧膜破膜	炉温过高/停留久/贴加热器/锐角	降温缩时、调风嘴、清洁封刀、加护角
Seal cracking 焊口开裂	能量不足/污染/隔折封/未冷即进炉	提能量、清刀、单层封、加冷却、剥离验证
Blocking 粘连结块	>30°C/日晒/张力大/抗粘不足/冷库未回温	<30°C避光、降张力、抗粘牌号、回温 24h
Static/tracking 静电走偏	干燥/高速/电晕过期/导辊偏	加除静电器、测达因、校辊降张力
Seam thinned 焊口变薄	横跨主收缩向/收缩比大/退火	焊口转 90 ° 、降收缩比、降封温延時

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