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Thermal Transfer Ribbon Compatibility Guide



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Thermal transfer printing: the flexible solution



Thermal transfer printing is a rapid and flexible solution to a very wide range of project needs where barcode readability and scannability is required. Ideal for both low end and demanding applications, it can be used to create durable, weather-resistant and chemical-resistant images, with high image quality.

There are many product/ribbon/printer combinations, and successful outcomes depend on mutual compatibility. This brochure describes key properties of the thermal transfer substrates, ribbons and printers that will allow selection of the right combination for particular applications. Close collaboration between Avery Dennison and major thermal transfer ribbon manufacturers ensures excellent performance, with easy conversion and high quality.

WHAT IS THERMAL TRANSFER PRINTING?

During thermal transfer printing, the printer's print head first selectively softens the coating on a transfer ribbon. The coating is then transferred directly onto a film or paper substrate. Many variables affect the quality of the final image and barcode properties. Optimum readability is possible only with the right combination of thermal transfer product, ribbon and printer. When all variables are selected carefully to be compatible, a good quality barcode is the result, with a label that is fit for purpose.

Regarding **substrates**, many different materials can be used. Typically, for self adhesive labelling, these are papers (coated and uncoated), polyolefins (polyethylenes and polypropylenes) and a range of polyester films. Avery Dennison is pleased to advise on substrate properties for specific applications.

Equally important is the **printer** used, because it will also influence the quality of the final image. There are two main printer types. A standard speed thermal transfer printer gives a resolution of 200-300dpi, at processing speeds below 10in/s. Such printers use flat print heads, and their lower printing speeds mean that the substrate does not require any special coatings. High speed printers use near-edge/corner-edge print heads, which allow higher processing rates above 10in/s. They usually operate at resolutions of 300-600dpi. With this printer type, a special ribbon and a coated substrate are needed.

The choice of **ribbon** is also critically important. There are three main categories of thermal transfer ribbon suitable for different applications:

Wax ribbons: These are the most economical choice, designed for use with flat head printers. Compatible with many coated and uncoated paper substrates, they allow high quality picket fence barcodes and numeric data. Where exceptional durability is not needed, a wax ribbon ensures cost effective and reasonably scratch/smudge-resistant images.

Ensuring compatibility

By choosing substrate, ribbon and printer correctly at the outset, conversion will be straightforward and the end product will survive all of the challenges it is designed to meet.

Wax/resin ribbons: Wax/resin ribbons are compatible with many different paper and filmic substrates, giving excellent print resolution on picket fence and ladder barcodes and suiting both flat head and corner-edge print heads. With higher abrasion resistance than wax ribbons, these ribbons are ideal for creating more durable labels that resist scratching and smudging. Depending on substrate, they also give higher resistance to many aggressive chemicals.

Resin ribbons: Resin ribbons are the right choice where both high print quality and durability are required. These ribbons are compatible with filmic substrates, and designed for both flat head and corner-edge print heads. Resin ribbons give a premium quality image that will resist high temperatures and a variety of aggressive chemicals.



Substrate characteristics

A selection of different substrates recommended for thermal transfer printing is shown below.

THERMAL TRANSFER PAPERS

Spec Code	Construction: Facestock Name	Adhesive	Liner	Total caliper	Adhesive performance	Typical application
AA004	TRANSFER VELLUM FSC	S2000N	BG40BR	0.137 mm	Permanent	Warehouse This white uncoated facepaper is specially designed to accept thermal transfer print. It is printable with speeds of up to 150 mm/s. It has low weather and chemical resistance, therefore suitable for warehouse labelling and other in-house labelling applications.
AJ112	TRANSFER VELLUM FSC	S2045N	BG40BR	0.138 mm	Permanent, Humid environment	
AA036	TRANSFER VELLUM FSC	R5000N	BG40BR	0.138 mm	Removable	
AF244	TRANSFER MP	S2000N	BG40BR	0.141 mm	Permanent	Box Labelling This smooth, matt pigmented facepaper is specially designed to accept thermal transfer print. It is printable with speeds of up to 200 mm/s. It has low weather and chemical resistance and is suitable for box-end labelling.
AL309	TRANSFER MP	S2045N	BG40BR IMP	0.139 mm	Permanent, Humid environment	
AM134	TRANSFER MP	R5000N	BG40BR	0.142 mm	Removable	
AF245	TRANSFER PLUS	S2000N	BG40BR	0.145 mm	Permanent	Pharmaceuticals This smooth, coated extra white facepaper is specially designed for thermal transfer printing. It is printable with speeds of up to 225 mm/s. It shows some weather and chemical resistance. This material is suitable for inventory, address and product identification labelling in pharmaceutical applications.
AL315	TRANSFER PLUS	S2045N	BG40BR	0.143 mm	Permanent, Humid environment	
AA011	TRANSFER SUPERIOR	S2000N	BG40BR	0.145 mm	Permanent	Critical applications labelling This smooth, coated, matt white facepaper is specially designed to accept thermal transfer print. It is printable with speeds of up to 250 mm/s. This material shows some weather and chemical resistance. It is suitable for critical print quality applications where barcode readability is a prime concern.
AL301	TRANSFER SUPERIOR	S2045N	BG40BR	0.143 mm	Permanent, Humid environment	

THERMAL TRANSFER FILMS

Spec Code	Construction: Facestock Name	Adhesive	Liner	Total caliper	Adhesive performance	Typical application
AF185	PE85 WHITE	S692N	BG40WH	0.155 mm	Permanent, Humid environment	Cosmetics This white corona treated polyethylene film is specially designed to accept thermal transfer print. It shows good weather resistance and resistance to some chemicals. This material is suitable for labelling of squeezable bottles, plastic bags and other flexible substrates.
AE403	PP TOP WHITE	S692N	BG40WH	0.130 mm	Permanent, Humid environment	Automotive, Industrial This white coated polypropylene film is specially designed for thermal transfer printing. It shows very good weather resistance and is resistant to various chemicals. This material is used for labelling of non-squeezable materials, mainly used in the automotive industry for under the hood applications.
AA008	PP LIGHT TOP WH	S692N	BG40WH	0.123 mm	Permanent, Humid environment	Automotive, Industrial This white coated polypropylene film is specially designed for thermal transfer printing. It shows very good weather resistance and is resistant to various chemicals. It is mainly used in the automotive industry and for labelling of small electronic parts due to its low caliper.
AF229	TRANSFER PE HD	S2045N	BG40BR	0.184 mm	Permanent, Humid environment	Drum labelling This matt, clay coated film gives an excellent thermal transfer print and excellence resistance to various aggressive chemicals. It is designed for use in very difficult application areas i.e. where surface is very rough and hence initial adherence surface contact is low. Typical applications can vary from shrink wrapped pallets to timber, rough metal castings and rough LDPE drums. Labels are also BS5609 part II (Labels for Marine Use) approved.
AM932	Global MDO White	S7000	PET23	0.89 mm	Permanent, Humid environment	Home and Personal Care This machine direction orientation film offers exceptional dimensional stability and allows cross directional conformability. It shows good weather resistance and resistance to some chemicals. This product is especially suitable for semi-squeezable bottles and other semi-flexible containers. To obtain a high gloss the label can be overvarnished.
AO377	Global MDO Top White	S7000	PET23	0.90 mm	Permanent, Humid environment	



Avery Dennison provides a detailed understanding of thermal transfer printing, and works with ribbon manufacturers to ensure effective recommendations of labelling material/ ribbon compatibility and printer choices. See the information tables for more on easy selections for desired applications.

For more information on any specific application, or for advice on using thermal transfer printing, please contact your usual Avery Dennison representative.

Selection Guide

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Papers

Films

	Flat head printer*			** Corner-edge head printer	
	Wax	Wax/ Resin	Resin	Wax/Resin	Resin
Transfer Vellum FSC				APR 600	APX 650
Transfer MP				APR 600	APX 650
Transfer Plus	AWX FH			APR 600	APX 650
Transfer Superior	AWX FH			APR 600	APX 650
PE85 White		APX FH	AXR7+	APX 650	
Global MDO White		APX FH	AXR7+	APR 600	APX 650
Global MDO Top White		APX FH	AXR7+	APR 600	AXR 600
PP Light Top White		APX FH	AXR7+		APX 650
PP Top White		APX FH	AXR7+		AXR 600
Transfer PE HD		APX FH	AXR7+	APR 600	APX 650

* All the material combinations were tested on a Zebra 140 Xill Plus printer

** All the material combinations were tested on TEC B-SX4T printer

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Papers

Films

		Wax	Wax/Resin	Resin	Flat head printer
Transfer Vellum FSC		TR4085+	TR5080		
Transfer MP		TR4085+	TR5080, TR6080		
Transfer Plus		TR4085+	TR5080, TR6080, M265	R300, R316	
Transfer Superior		TR4085+	TR5080, TR6080		
PE85 White			TR5080, TR6080		
Global MBO White			TR5080, TR6080		
Global MBO Top White			M265	R300, R510, R510HF	
PP Top White			M265	R300, R510, R510HF	
Transfer PE HD			TR5080, TR6080, M265	R300	

All the material combinations were tested on the Zebra 140XiIII printer

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Papers

Films

		Flat head printer*			** Corner-edge head printer			
		Wax	Wax/ Resin	Resin	Wax/Resin			
	Transfer Vellum FSC	GP725	Flex Mark ECO	PM308			Net Mark, Net Mark IQ	
	Transfer MP	GP725	Flex Mark ECO	PM308			Net Mark, Net Mark IQ	
	Transfer Plus	GP725	Flex Mark ECO	PM308			Net Mark	
	Transfer Superior	GP725	Flex Mark ECO	PM308			Net Mark	
	PE85 White			PM308			Net Mark, Net Mark IQ, Net Premium	
	Global MDO White			PM308	SP330		Net Mark, Net Mark IQ, Net Premium	
	Global MDO Top White			PM308	SP330		Net Mark, Net Mark IQ, Net Premium	
	PP Light Top White			PM308	PM255	SP330	SP575	Net Mark, Net Mark IQ, Net Premium
	PP Top White			PM308	PM255	SP330	SP575	Net Mark, Net Mark IQ, Net Premium
	Transfer PE HD			PM308	PM255	SP330	SP575	Net Mark, Net Mark IQ, Net Premium

* All the material combinations were tested on a Zebra 140 Xill Plus printer

** All the material combinations were tested on TEC B-SX4T printer

PM: Prime Mark

Ricoh

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Papers

	Flat head printer*	** Corner-edge head printer		
	Wax/Resin	Resin	Wax/Resin	Resin
Transfer Vellum FSC	B110A, B110TI			
Transfer MP	B110A, B110TI			
Transfer Plus	B110A, B110TI		B120E, B130EV	
Transfer Superior	B110A, B110TI			
PE85 White	B110A, B110TI	B110CR, B110CX	B120E, B130EV	
Global MDO White	B110A, B110TI	B110C, B120EC	B120E	
Global MDO Top White	B110A, B110TI	B110C, B120EC	B120E	
PP Light Top White	B110A, B110TI	B110CR, B110CX, B120EC		B120EC
PP Top White	B110A, B110TI	B110CR, B110CX, B120EC		B120EC
Transfer PE HD	B110A, B110TI	B110CR, B120EC	B120E, B130EV	B120EC

* All material combinations were tested on the Zebra Z4M+ - 300DPI and SATO GTe408e - 200DPI printers

** All material combinations were tested on the Tec B-SX4T - 200DPI and Avery 6404 - 300DPI printers

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Papers

		Wax	Wax/ Resin	Resin	Wax/Resin	Flat head printer*	** Corner-edge head printer
Transfer Vellum FSC		T084, T056					
Transfer MP		T084, T056		T083			
Transfer Plux		T084, T056		T083, T001			
Transfer Superior		T084		T001, T044			
PE85 White			T083, T001, T044		T016, T077	T037, T073	
Global MDO White			T083, T001, T044		T016, T072		
Global MDO Top White				T044	T016, T072	T037, T073	
PP Light Top White				T083, T001, T044	T016, T072	T037, T073	
PP Top White				T083, T001, T044	T016, T072		
Transfer PE HD				T083, T001, T044	T050		

* All the material combinations were tested on a Zebra 140 Xill Plus printer

** All the material combinations were tested on TEC B-SX4T printer

About Avery Dennison

Avery Dennison (NYSE:AVY) is a global leader in labeling and packaging materials and solutions. The company's applications and technologies are an integral part of products used in every major market and industry. With operations in more than 50 countries and more than 25,000 employees worldwide, Avery Dennison serves customers with insights and innovations that help make brands more inspiring and the world more intelligent. Headquartered in Glendale, California, the company reported sales of \$6.3 billion in 2014. Learn more at www.averydennison.com.

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