



Validation Report: Polyplex Matte PET EVA



Subject: Pack Ready validation test report for POLYPLEX (film supplier) / KARLVILLE trial

Date October 03, 2019

(Supplier & Product) POLYPLEX MATTE PET EVA - SUBMITTED FOR EVALUATION

Requirements:

1. Roll Details:

In Table 1 list number of rolls, size of rolls and details of all thermal lamination films including product codes, corona treatment, additives (if applicable) etc...

2. SAMPLES to be sent to Israel:

- a. 70m (230ft.) of laminated material (see test protocol supplied by HP-Indigo R&D)
- b. Pouching: Karlville to send pouches of the laminated film - **N/A**

Procedure:

Roll Details and condition: Each of the produced rolls underwent an incoming inspection and tested for:

- ▶ Visual inspection: Record general condition and/or any defects (coating quality, visual defects) & Curling
- ▶ Constructions: Each construction shall be listed along with all pertinent details captured in Table 2

Production /summary: Run lamination test based on test protocol supplied by HP R&D. fill Table 3 for process parameters.

- ▶ LBS testing: Each construction will be subject to Lamination Bond Strength (LBS) measurements as indicated in the test protocol. LBS measurements will be performed as follows:
 - Immediately after the lamination (to be performed by Karlville)
 - 24 hours after the lamination (to be performed by Karlville)
 - 2-4 weeks after the lamination (to be performed in parallel by Karlville & HP-Indigo R&D @ Israel)



Table 1 – Roll details:

Product code	Material	Resin EMA or EVA	Thickness [µm]	Roll width [mm]	Corona treatment [Y/N]	Additives
205357	PET PREMIUM MATTE	EVA	30	750	YES	N/A

Table 2 - Production summary & experimental details:

EXP. #	Printed substrate	Surface / reverse print	TAP substrate	TAP on top or 2'nd	Total Thickness [µm]
RS-008	12um PET / 62.5um PE	SURFACE	POLYPLEX PET MATTE 30 um EVA	TOP	104.5

Table 3 - Process parameters:

EXP. #	Nip temperature [°C]	Lamination speed [m/min]	Corona on TAP [W]	Corona on print [W]	Wrapping angle [deg.]	Tension print [kg]	Tension tap [kg]	Tension RW [kg]	Tension infeed [kg]	Pressure [Bar] L/R	Pre- Heat [°C]
RS-008	110	50	2.5	2.5	75	2.0	8.0	6.0	10.0	1.0 / 1.0	75

1. Pre-lamination – film inspection remarks:

- ▶ Curling score (in cm TD and MD): Minor downwards curl on the PET/PE solventless laminated material due to excessive rewind tension
- ▶ Thermal active layer coating quality: Good
- ▶ Visual defects: N/A
- ▶ Comments: The curl on the PET/PE was eliminated by increasing the tension on the tap.



2. Post lamination results:

Exp. #	Composition	AVG. LBS [N/in] (Failure mode*)						Visual appearance (Y/N)			
		Left side of hot drum OS			Right side of hot drum GS			Curling	Wrinkles	Pinching	
		Patch 22	Patch 16	Patch 11	Patch 22	Patch 16	Patch 11				
RS-008	PE/ADHESIVE/PET/INK/EVA PET MATTE	t=0	14.3	15.1	18.8	13.4	14.3	18.2	N/A	N/A	N/A
		t=24	TEAR	TEAR	TEAR	TEAR	TEAR	TEAR			

* The abbreviations of the failure modes stand for the following:

NT - Not transfer of ink from the printed substrate to laminated substrate

TT - Total transfer of ink from the printed substrate to laminated substrate

PT - Partial Transfer of ink from the printed substrate (write the percentage of ink remaining on the printed substrate)

PTT - Partial TAP transfer from the Pack Ready film

TTT - Total TAP Transfer from the Pack Ready film to the printed substrate

3. Sealing bond strength results tested under the conditions below:

	Dwell time [sec]	SBS [N/in]					
		170C	180C	190C	2000C	210C	
RS-008	PE/ADHESIVE/PET/INK/EVA PET MATTE	PE	0.5				
			1				



4. Sealed are appearance:

			Dwell time [sec]	SBS [N/in]				
				170C	180C	190C	200C	210C
RS-008	PE/ADHESIVE/PET/INK/ EVA PET MATTE	PE	0.5					
			1					

Colorcode reflects property rating: ■ Red=Bad ■ Yellow=Moderate ■ Green = Good

Summary:

Great lamination bond strength performance was achieved between the digitally surface printed 75um PET/PE (solventless laminated) than thermally laminated to a 30um Polyplex EVA Premium Matte PET. Results show very high LBS values post lamination and total disruct post 24 hours at speeds of 50M/min.

The lamination of Polyplex Matte Premium EVA to the surface printed PET/PE yielded very high adhesion and pull strength results. In addition to overall great appearance, no finished curl and rapid set up, 10 minutes and 40M used.

Therefore, Polyplex PET Matte EVA has passed the lamination validation process.

A 70M roll was sent to R&D Israel for further testing.