



# Validation Report: Nobelus Gloss Nylon EVA



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

**Date** July 11, 2019

(Supplier & Product) NOBELUS NYLON GLOSS SUPER FLAT - 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
LFNGD - PLATINUM	NYLON GLOSS SUPER FLAT	EVA	30 µm	755	YES	

**Table 2 - Production summary & experimental details:**

EXP. #	Printed substrate	Surface / reverse print	TAP substrate	TAP on top or 2'nd	Total Thickness [µm]
RS-002	12um PET / 62.5um PE	SURFACE	NOBELUS NYLON GLOSS SUPER FLAT	TOP	100

**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-002	120	75	3.0	3.0	50	2.0	4.0	6.0	10.0	.5 / .5	75

**1. Pre-lamination – film inspection remarks:**

- ▶ Curling score (in cm TD and MD): MINOR DOWNWARDS CURL DUE TO EXCESSIVE REWIND TENSION ON THE PET/PE SOLVENTLESS LAMINATED MATERIAL
- ▶ 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-002	PE/ADHESIVE/PET/INK/EVA NYLON GLOSS SUPER FLAT	t=0	14.6	15.2	19.7	14.5	14.9	21.2	N/A	N/A	N/A
		t=24	15.1	15.1	18.4	14.4	15.1	19.9			

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

- NT – No 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:**

	Composition	PE 62.5um	Dwell time [sec]	SBS [N/in]				
				170C	180C	190C	200C	210C
RS-002	PE/ADHESIVE/PET/INK/ EVA NYLON GLOSS SUPER FLAT	PE 62.5um	0.5	2.6	19.7	33.0	41.2	50.1
			1	29.8	37.5	38.9	45.0	57.2



4. Sealed are appearance:

			Dwell time [sec]	SBS [N/in]				
				170C	180C	190C	200C	210C
RS-002	PE/ADHESIVE/PET/INK/EVA NYLON GLOSS SUPERFLAT	PE 62.5um	0.5					
			1					

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

**Summary:**

Results show excellent lamination and adhesion performance between the digitally surface printed electroctastic ink on PET/PE and the Nobelus Nylon Gloss Super Flat Thermal Film - *See Table #3 for best working conditions / process parameters.*

- NIP pressure higher than .5 bar resulted in pinching and wrinkles.
- Lower speeds resulted in curling in TD (50M/min.).
- Lower temperatures (100C) resulted in cloudiness and/or silvering or lack of adhesion.

Based on the SBS test results and appearance the suggested sealing temperature should be 180C and 1.0 second dwell time or 196C-200C and 0.5 dwell time which will allow the poucher to run at faster speeds. At 200C and 1.0 sec. dwell time shows moderate color change, at 210C and 1.0 second dwell time there is bad color change due to the high temperature and dwell time.

The lamination of Nobelus Nylon Superflat to the surface printed PET/PE yielded very high adhesion and pull strenght results even at high speeds of 75M/min and low NIP pressure. In addition to overall clear and glossy appearance, no finished curl and rapid set up, therefore the Nobelus Nylon Gloss Super Flat has passed the lamination validation process.

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