



Validation Report: Taghleef EVA MBOPP



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

Date March 05, 2020

(Supplier & Product) : TAGHLEEF MET-BOPP HS - 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. 50m 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
ZT21	MET-BOPP HS	EVA	32	750	NO	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-011	BOPP 20um	REVERSE	MET-BOPP HS 32um	2nd	52

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-011	120	60	2.0	2.0	75	7.0	2.0	10	8.0	1.0 / 1.0	75

1. Pre-lamination – film inspection remarks:

- ▶ Curling score (in cm TD and MD): N/A
- ▶ Thermal active layer coating quality: Good
- ▶ Visual defects: N/A
- ▶ Comments:



LBS TESTS CRITERIA

Construction	Pass	Fail
PET//PE, PET//AI-PE, BOPP//PE BOPP//BOPP, BOPP//Met-BOPP	LBS > 3.5 N/inch + Tear and/or PT failure	LBS < 3.5 N/inch + NT, Zip or TT failure mode

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-011	MET-BOPP HS / INK / BOPP	t=0	7.5	8.1	6.0	13.5	10.5	7.1	MINOR IN MD 5mm	N/A	N/A
		t=24	6.3	6.7	6.8	9.4	7.4	5.5			

* 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



SBS Test - will be done on strips: 19, 20, 21, 22, 23, 24 - please add Photo of sealing area, for visual appearance

SBS TESTS CRITERIA

Seal layer	Pass [N/Inch]	Fail [N/Inch]
BOPP	SBS > 4 or <6	SBS < 4 or SBS > 6

3. Sealing bond strength results:

	Dwell time [sec]	SBS [N/in]				
		120C	130C	140C	150C	160C
RS-011 MET-BOPP HS / INK / BOPP HS BOPP FLAT BAR	0.5	DL	DL	DL	1.6	4.5
	1	DL	DL	4.4	4.5	4.7
	0.5					
	1					
GROOVED	0.5					
	1					

4. Sealed are appearance:

	Dwell time [sec]	SBS [N/in]				
		120C	130C	140C	150C	160C
RS-011 MET-BOPP HS / INK / BOPP HS BOPP	0.5					
	1					

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



COF Test will be done for each laminated sample, and comparison to the non-laminated thermal film

- ▶ In HFFS (horizontal form fills and seal) systems, too much friction of the sealant side of the film can lead to film dragging or jamming as it passes over metal plates.
- ▶ In VFFS (vertical form fills and seal) systems, too much friction of the sealant side of the film can cause poor film feeding over metal forming collars, inconsistent package sizes, and squealing.

COF TESTS CRITERIA

FFS	Pass	Fail
VFFS - In to In (Seal)	0.20 - 0.30	COF <0.20 or >0.31
VFFS - Out to Out (Print)	0.25 - 0.35	COF <0.24 or >0.36
HFFS - In to In (Seal)	0.20 - 0.45	COF <0.20 or >0.46
HFFS - Out to Out (Print)	0.25 - 0.45	COF <0.24 or >0.46

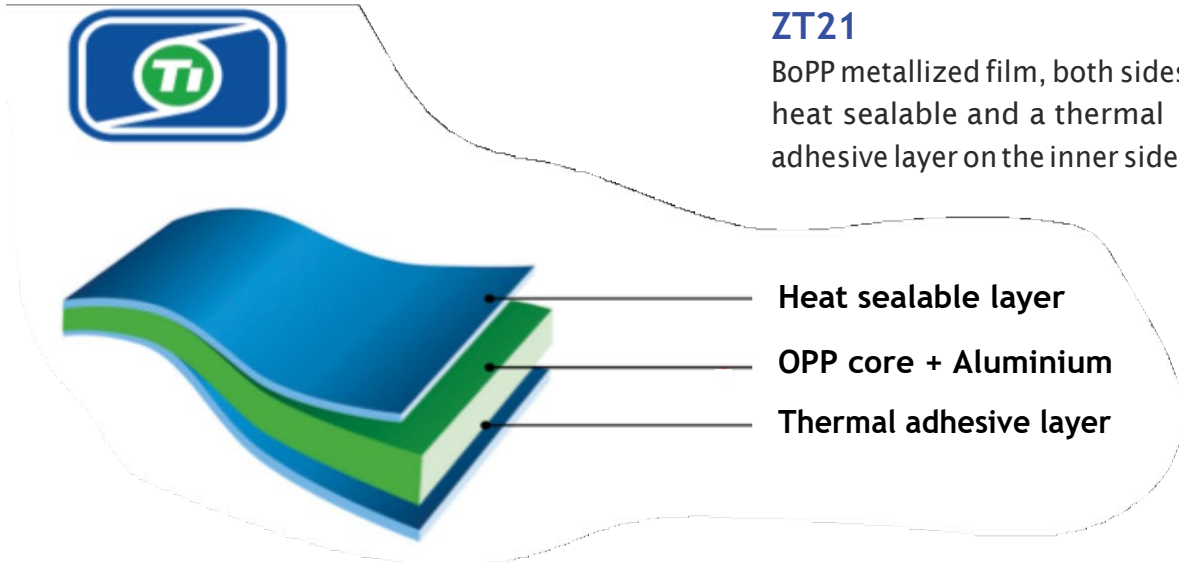
EXP #: RS-011		IN / IN (SEAL) KINETIC	OUT / OUT (PRINT) KINETIC
LAMINATED CONSTRUCTION	#1	0.37	0.25
	#2	0.43	0.28
	#3	0.48	0.44
	#4	0.26	0.30
	AVG	0.39	0.32
	STD	0.09	0.09



EXP #: RS-011		IN / IN (SEAL) KINETIC	OUT / OUT (PRINT) KINETIC
TEST ON NON-LAMINATED FILM WILL BE DONE ON EMPTY SIDE			
NON-LAMINATED CONSTRUCTION	#1	0.25	
	#2	0.27	
	#3	0.27	
	#4	0.26	
	AVG	0.26	
	STD	0.01	



Taghleef Material TDS



Product Description:

Metallized film with one side heat sealable and the inner side includes a heat-activated thermal adhesive polymer layer, also called TAP.

This thermal active layer is melted by the heated nip roll when going through the lamination machine.

This allows for a strong bond with the HP Indigo ElectroInk printed layer, resulting in a mechanically interlocked molecular structure.

The output is a fully-cured laminated structure, ready for slitting and pouch making.

Properties

- ▶ Very good moisture barrier
- ▶ Good oxygen barrier
- ▶ Good mechanical properties
- ▶ High light barrier
- ▶ High-performance lamination
- ▶ Zero cure time lamination system
- ▶ Immediate time to market
- ▶ Short print runs

Typical Applications

Ideal for HP Indigo Pack Ready Lamination™.

After being laminated with other films the resulting material can be used for the following applications:

- ▶ Snacks
- ▶ Dry food
- ▶ Pet food
- ▶ Cosmetics
- ▶ Confectionary
- ▶ Coffee
- ▶ Wet wipes

**ZT21**

Properties	Method	Unit	Ref.	Typical values
Nominal thickness	Internal method	µm		32
Unit weight		g/m ²		29.5
Yield		m ² /kg		33.9
Optical density (O.D.)	Internal method			2.0
Dynamic cof	ASTM D1894		NT/NT	0.40
Thermal shrinkage	OPMA TC4(a)	%	MD TD	6.0 3.0
Heat seal range	Internal method	°C		95÷115
Seal strenght	Internal method 130 °C; 0.5 s	g/cm	NT/NT	230
Tolerance				
Weight		≤ 1.000 kg 1.001-10.000 kg > 10.000 kg		± 20% ± 10% ± 5%

Storage, Handling and Application:

ZT21 does not require special storage conditions. A storage temperature below 30°C is recommended in order to minimise the deterioration of the film properties in general. It is advisable to turn over the inventory according to the delivery date (first in-first out). The film should be conditioned in the operating environment at least for 24 hours before processing. ZT21 is suitable for use up to 6 months from the date of production.

Indication of Adhesive Layer:







ZT21 is usually supplied with EVA on the internal layer.

Food Contact:

ZT21 complies with EC. Specific documents and MSDS are available on request.

The property values represented in the table do not constitute product specifications, but represent the average of typical values. Use of this information is limited to the specific recipient. While the information is accurate to the best of our knowledge as of the date compiled, it is limited to the information as specified. No representation or warranty, expressed or implied, is made regarding the information, or its completeness or fitness to a particular use. The user is solely responsible for all determinations regarding use and we disclaim liability for any loss or damage that may occur from the use of this information. Ti does not guarantee the typical (or other) values.



					Taghleef Industries					
Tipo de Film: ZT21		Espesor 32 µm		Tratamiento  TO		Fecha: 12.11.2019			Op.1220--8	
Lote: 7218722										
Nº Pedido TI: 115373/005			Fecha Cons. Pref.: 10.05.2020							
Pedido: 										
Ancho: 750 mm		Longitud: 1350 m		Superficie: 1013 m²		Peso Neto: 30,910 Kg		Empalmes: m m		
Medidas: 										
Nº Pedido Cliente: .			Cód. Mat. Cli.:							
Observaciones: En caso de reclamación, enviar muestra y etiqueta										
					Produced in EU					
7218722					Recomendamos quitar la primera capa de film.					



5mm CURL INMD









SEAL APPEARANCE @ 150C AND 1.0 SEC DWELL TIME





SEAL APPEARANCE @ 140C AND 1.0 SEC DWELL TIME





Summary:

The lamination between the reverse printed 20um BOPP and Taghleef MET-BOOP HS / EVA 32um resulted in good lamination bond, appearance and acceptable SBS.

The Taghleef MET-BOOP ran very smooth and without any issues, minimal set up material was used.

We recommend sealing at 140C and 1.0 sec dwell time. *See pictures above.*

Based on the results listed above the Taghleef MET-BOOP HS has passed the requirements listed in the validation process.