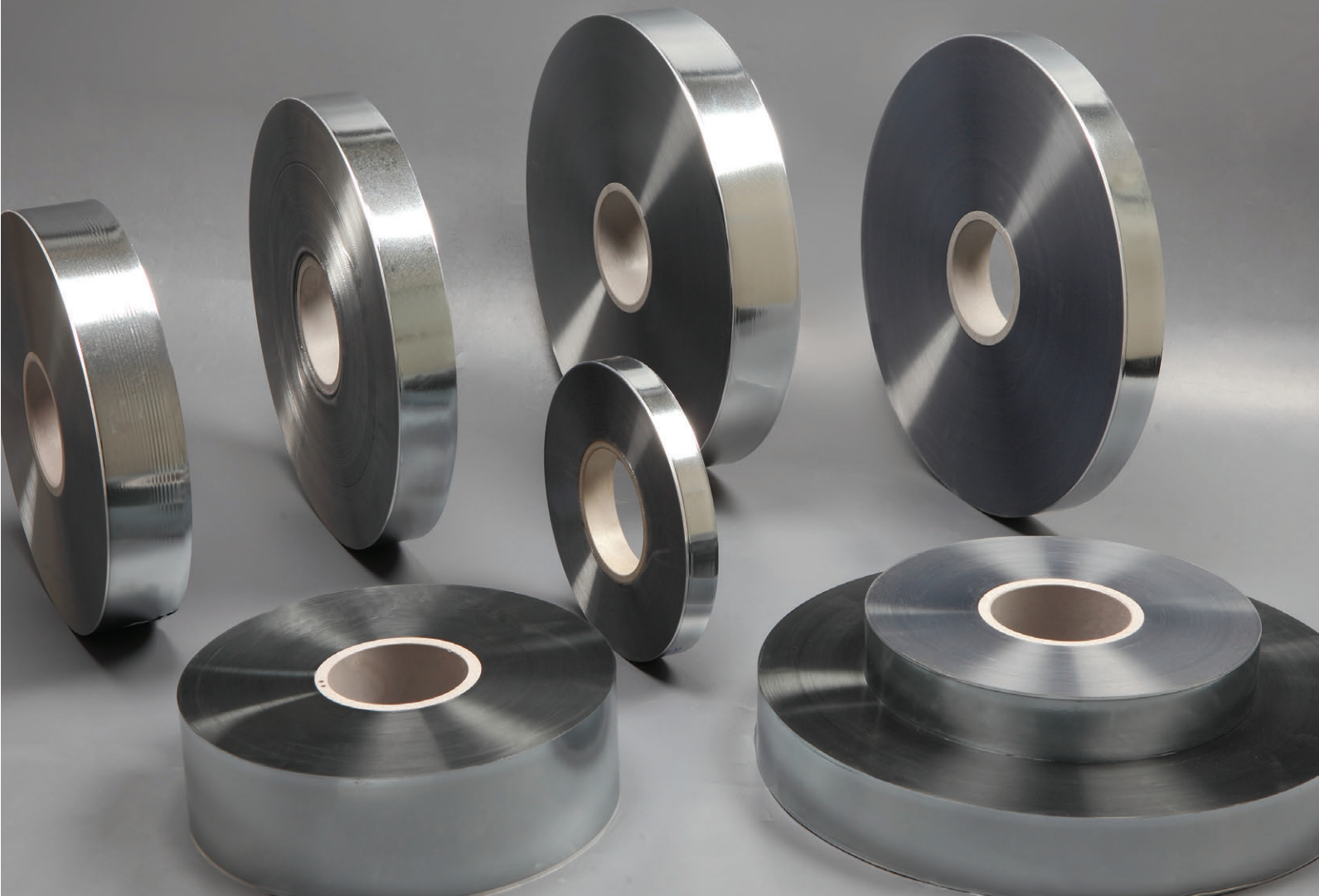




TIBCON

M P P F I L M

Zinc - Aluminum
Metallized
Polypropylene Film
For Capacitors



Tibrewala Electronics Limited (TEL)

TEL is one of the most renowned manufacturers of Metallized Polypropylene Film in India.

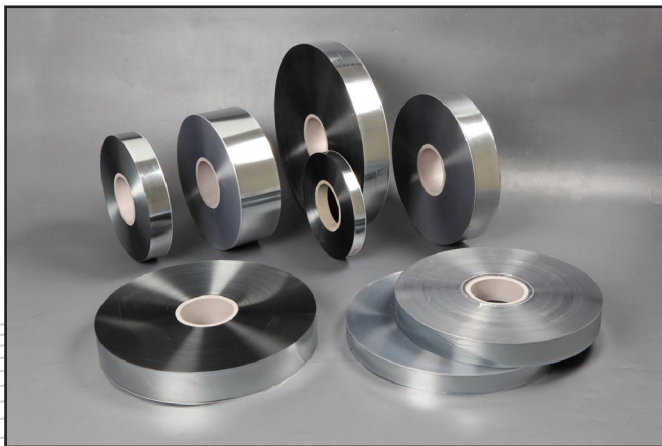
TEL has successfully reached the elite US\$ 20 Million segment and has ventured to capture global markets across Asia, Africa, Australia, Europe and America.

TEL has an established presence of nearly three decades in the sector.

TEL has become an invaluable resource in the manufacture of defence electronics, industrial machinery and domestic appliances of international reputed brands .

Presently over 40% of TEL's products are earmarked exclusively for export.

With a staggering investment of over US\$ 15 Million, today TEL proudly stands on the threshold of phenomenal outbound growth, adding value to our partners, customers and vendors, thus strongly contributing to the nation's industrial strength.



Current Metalization Infrastructure

TEL has 4 world class metalization lines which include machinery from Leybold Optics & Applied Materials.



Slitting Infrastructure

TEL has over 10 Slitting Lines which are best in the world. Slitting is done in Class-10,000 Clean Rooms, having humidity and temperature controls. TEL specializes in Wave Cut Technology. Reel Widths can range from 25mm to 125mm.



Quality Infrastructure

TEL does extensive Quality Inspections at every stage right from Inward Inspection to Final Testing.

Various tests performed are as follows:

1. BOPP Gauge Variation.
2. Corona Treatment Test.
3. Visual Inspection for determining any wrinkles / winding / damages.
4. In process Inspection during Metalizing stage (All Process Parameters like Resistivity, Type, Free Margin, etc Pertaining to Metalization).
5. Post Metalization Sample Inspection to determine quality of Metalization (Adhesion Test).
6. In process Inspection during slitting stage (Reel Width, Free Margin Width & Surface finish of slitted Reel)
7. Post Slitting Test like Resistivity of Surface and Heavy Edge, BDV, Visual Inspection (Scratches, Wrinkles, etc)
8. During Packing Stage Vacuum Sealing Quality is also inspected.

Plain Film

Physical Properties

1. Standard Thickness (M.M.V)

P P	
Thickness	Tolerance
4.0μm	3.8 - 4.3
5.0μm	4.8 - 5.3
6.0μm	5.8 - 6.3
7.0μm	6.8 - 7.3
7.5μm	7.3 - 7.7
8.0μm	7.8 - 8.3
9.0μm	8.8 - 9.3
10.0μm	9.8 - 10.3
12.0μm	11.8 - 12.3

2. BDV in Sheet, Width

P P		
Thickness	BDV (V/DC)	Width (mm)
4.0μm	Thickness X 450 over	21.0 mm and up
5.0μm		
6.0μm		
7.0μm		
7.5μm		
8.0μm		
9.0μm		
10.0μm		
12.0μm		

3. Typical Value

P P	
Part	Value
Density(g/cm ³)	0.91
Tensile Strength (kg/mm ²)	over 13
Elongation(%)	below 230
Heat Shrinkage(%)	MD below 5 TD below 1
Dissipation Factor	below 0.05

4. Core

P P			
Material	Inner-Dia	Wall Thickness	Width Tolerance
Plastic	76 ± 1mm	5 or 7mm	width ± 0.1mm

5. Roll Outer Diameter

180mm ± 20mm, 240mm ± 20mm, 330mm ± 20mm



MPP Film

Physical Properties

1. Thickness (Typical Value)(M.M.V)

P P	
Thickness	Tolerance
4.0 μm	3.8 - 4.3
5.0 μm	4.8 - 5.3
6.0 μm	5.8 - 6.3
7.0 μm	6.8 - 7.3
7.5 μm	7.3 - 7.7
8.0 μm	7.8 - 8.3
9.0 μm	8.8 - 9.3
10.0 μm	9.8 - 10.3
12.0 μm	11.8 - 12.3

2. Tensile (Typical Value)

P P				
Thickness	Tensile Strength(kg/mm ²)		Elongation at break(%)	
	MD	TD	MD	TD
4.0 μm	20.0	35.0	170	50
5.0 μm	20.0	35.0	170	50
6.0 μm	20.0	35.0	170	60
7.0 μm	18.0	35.0	180	60
8.0 μm	18.0	35.0	180	60
9.0 μm	18.0	35.0	190	60
10.0 μm	18.0	35.0	190	60
12.0 μm	18.0	35.0	190	60

3. Melting Point & Density

P P	
M.P (°C)	DENSITY(g/cm ³)
202 °C	0.90 g/cm ³
200 °C	0.89 g/cm ³
-	0.91 g/cm ³

Electrical Properties

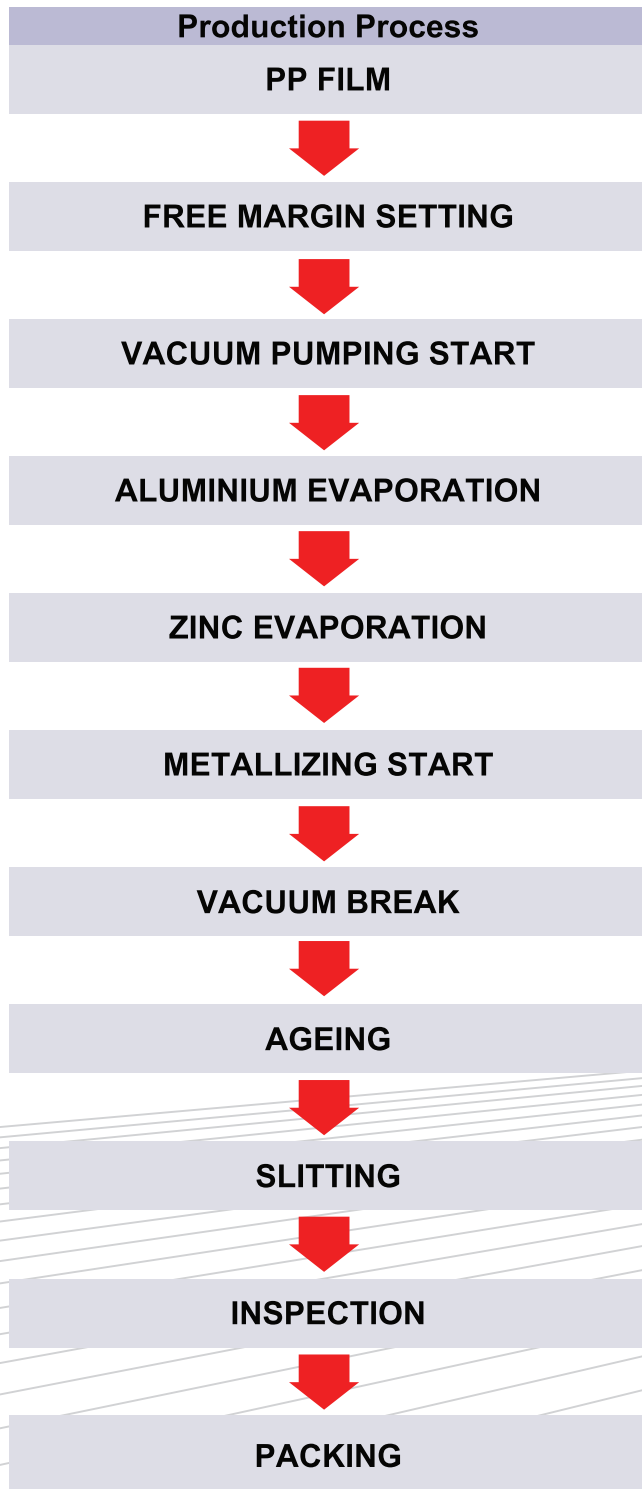
1. General

P P			
Properties		Typical Value	Test Method
Dielectric Constant	23 °C - 50 Hz	2.2	ASTM D 150
	23 °C - 1 KHz	2.2	
	90 °C - 1 KHz	2.2	
	125 °C - 1 KHz	2.2	
Dissipation Factor	23 °C - 50 Hz	2 x 10 ⁻⁴	ASTM D 150
	23 °C - 1 KHz	2 x 10 ⁻⁴	
	90 °C - 1 KHz	2 x 10 ⁻⁴	
	25 °C - 1 KHz	2.5 x 10 ⁻⁴	
Volume Resistivity	23 °C	10 ¹⁸ Ωcm	ASTM D 257
	100 °C	10 ¹⁷ Ωcm	
Surface Resistivity	23 °C - 80% RH	10 ¹⁴ Ω	ASTM D 257
	23 °C - 30% RH	10 ¹⁶ Ω	

1. B.D.V. in Sheet Form

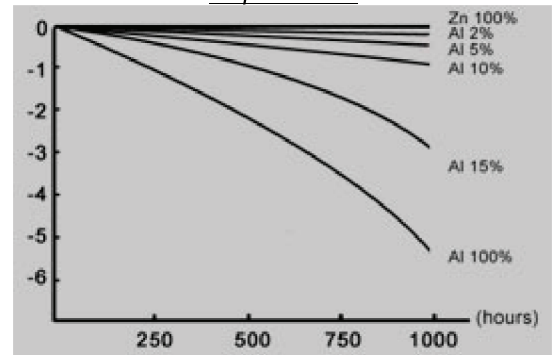
P P		
Thickness	\bar{x} (KV.DC)	Min (KV.DC)
4.0 μm	2.0	1.4
5.0 μm	2.8	2.2
6.0 μm	3.0	2.4
7.0 μm	3.5	2.9
8.0 μm	4.0	3.4
9.0 μm	5.0	4.4
10.0 μm	6.0	5.4
12.0 μm	6.5	5.9

General Information



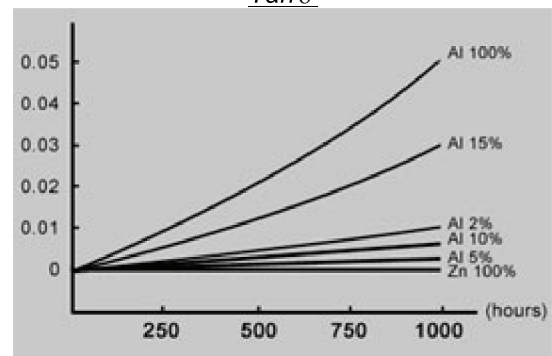
Production Process

Capacitance



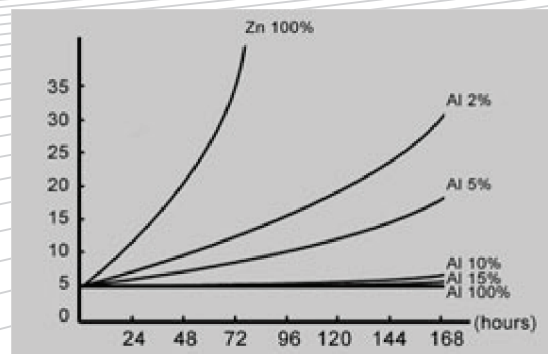
8 μ OPP/5 μ F, 400V AC/80°C
 Capacitance reduction to the proportion of Al

Tan δ



8 μ OPP/5 μ F, 400V AC/80°C
 Tan increase to the proportion of Al

Resistance



40°C,
 80%RH
 Resistance increase to the proportion of Al

General Specification MPP Film

Standard Thickness Width and Metal Free Margin

Thickness	Width	Free Margin
4.0 μm	21 mm and up	1.5 mm 2.0 mm 2.5 mm 3.0 mm 4.0 mm
5.0 μm		
5.5 μm		
6.0 μm		
6.5 μm		
7.0 μm		
7.5 μm		
8.0 μm		
9.0 μm		
10.0 μm		
12.0 μm		

Roll Outer Diameter

Type	Nomination	Tolerance
A	180 mm	+5 -20mm
B	240 mm	+5 -20mm
C	330 mm	+5 -20mm

.Each lot contain up to 10% of rolls having smaller O.D the tolerance as required or confirmed specification.

Cores

Material	Inner - Dia	Wall Thickness	Width Tolerance
Plastic	76 \pm 1.0	5 or 7 mm	Width \pm 0.1 mm

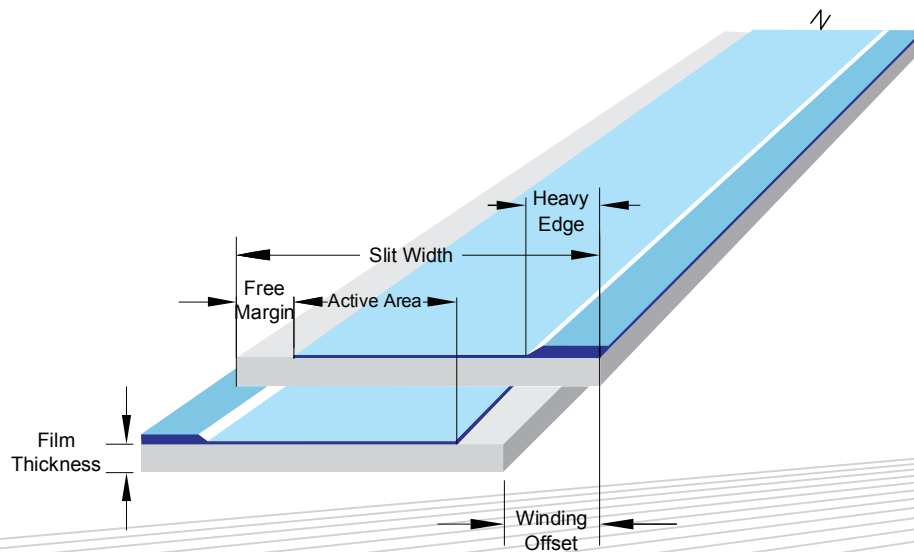
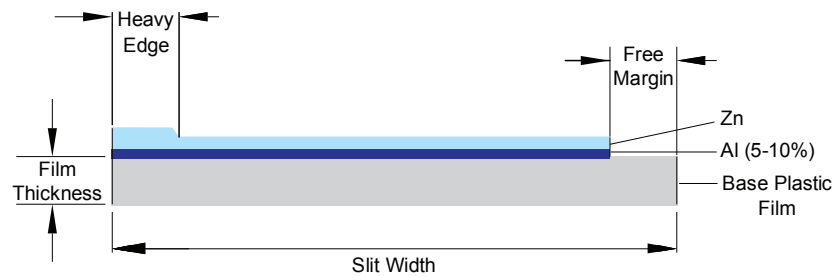
Tolerance of Slit Width and Free Margin

Slit Width	Metal Free Margin
21 to 37.5 mm: \pm 0.3mm	1.5mm : \pm 0.3mm 2.0mm : \pm 0.3mm
50 to 125 mm: \pm 0.4mm	1.5mm : \pm 0.3mm 2.0mm : \pm 0.3mm 2.5mm : \pm 0.4mm 3.0mm : \pm 0.5mm 4.0mm : \pm 0.5mm



ZAMPP: AL-Zn STD METALLIZED POLYPROPYLENE FILM

1.STRUCTURE



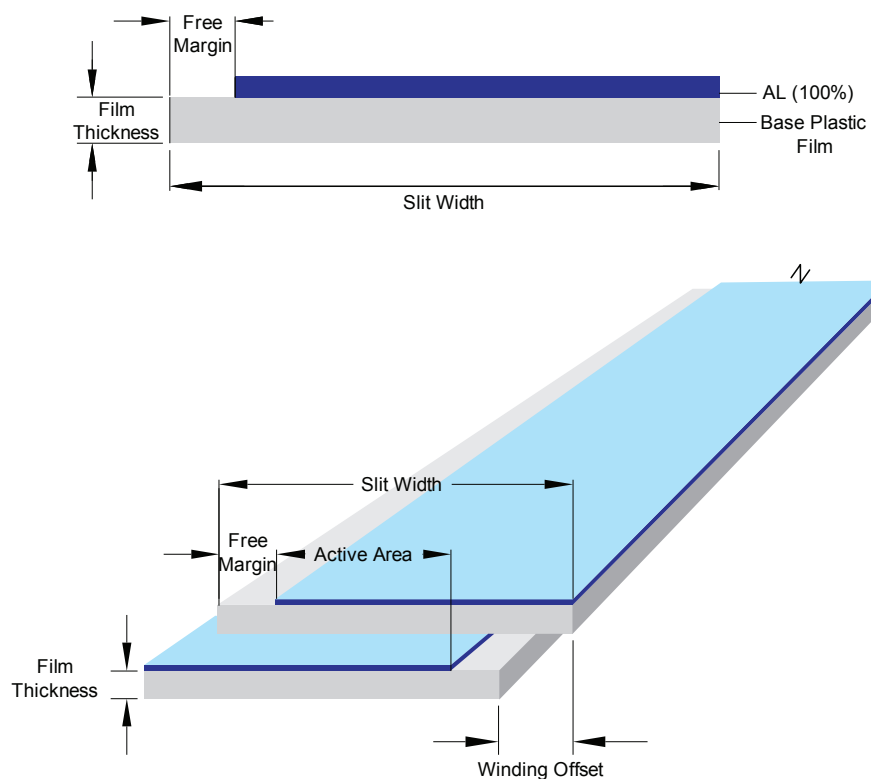
2.STANDARD RESISTANCE

Use	Film Width	Active Area (Ω/\square)	Heavy Edge (Ω/\square)
AC	25 to 125mm	7.5 + 2.5 -2.0	2.5+1.0 -1.0

.Other resistances are available on request

ALMPP: PURE AL METALLIZED POLYPROPYLENE FILM

1.STRUCTURE



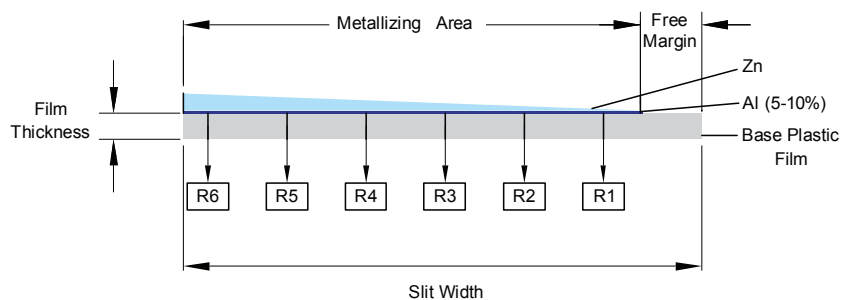
2.STANDARD RESISTANCE

Use	Film Width	Active Area (Ω/\square)
Lighting	25 to 125mm	$3.0 \pm 1.0\Omega/\square$

.Other resistances are available on request

ZAMPP: AL-Zn SLOPE/RMF METALLIZED POLYPROPYLENE FILM

1.STRUCTURE

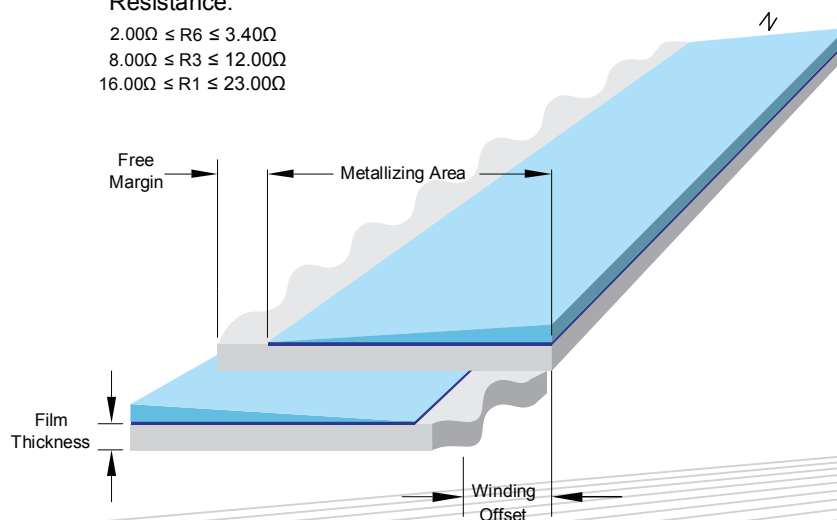


Resistance:

$$2.00\Omega \leq R6 \leq 3.40\Omega$$

$$8.00\Omega \leq R3 \leq 12.00\Omega$$

$$16.00\Omega \leq R1 \leq 23.00\Omega$$



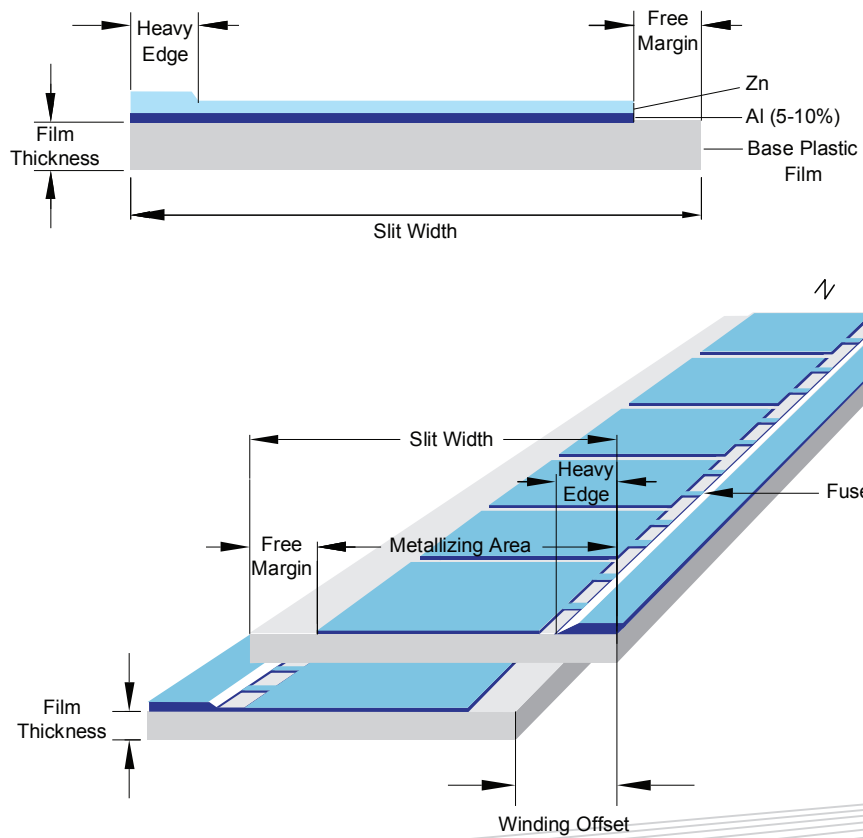
2.STANDARD RESISTANCE

Use	Film Width	Met Type	Active Area R3 (Ω/\square)	Heavy Edge R6 (Ω/\square)
PFC	37.5 to 75mm	Slope/RMF	19.0 + 4.0 -3.0	2.5+1.0 -1.0

.Other resistances are available on request

ZAMPP: AL-Zn SEGMENTED METALLIZED POLYPROPYLENE FILM

1.STRUCTURE



Special dimensions are available by prior mutual agreement

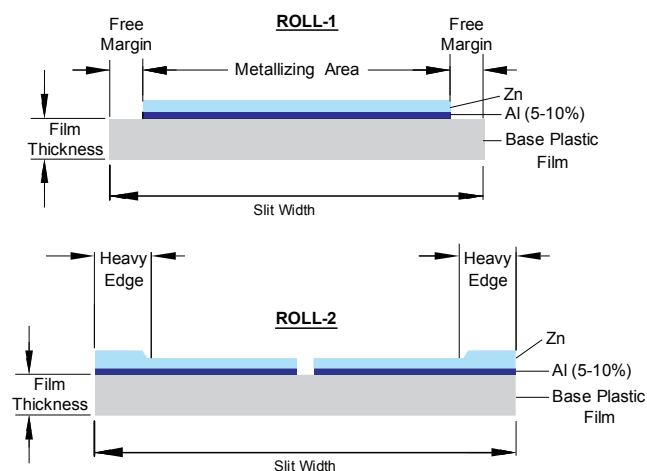
2.STANDARD RESISTANCE

Use	Active Area	Heavy Edge
AC	$10 \pm 3.0\Omega/\square$	$\leq 3.0\Omega/\square$

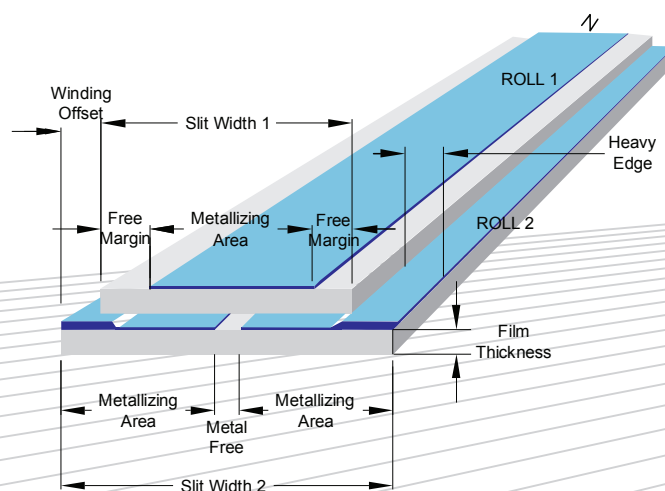
.Other resistances are available on request

ZAMPP: AL-Zn METALLIZED POLYPROPYLENE FILM (SERIES)

1. STRUCTURE



To protect the winding off-set roll1 should be smaller than roll2



Special dimensions are available by prior mutual agreement

2. RESISTANCE

Use	Type
AC	Lighting-HV
PFC	Heavy Duty

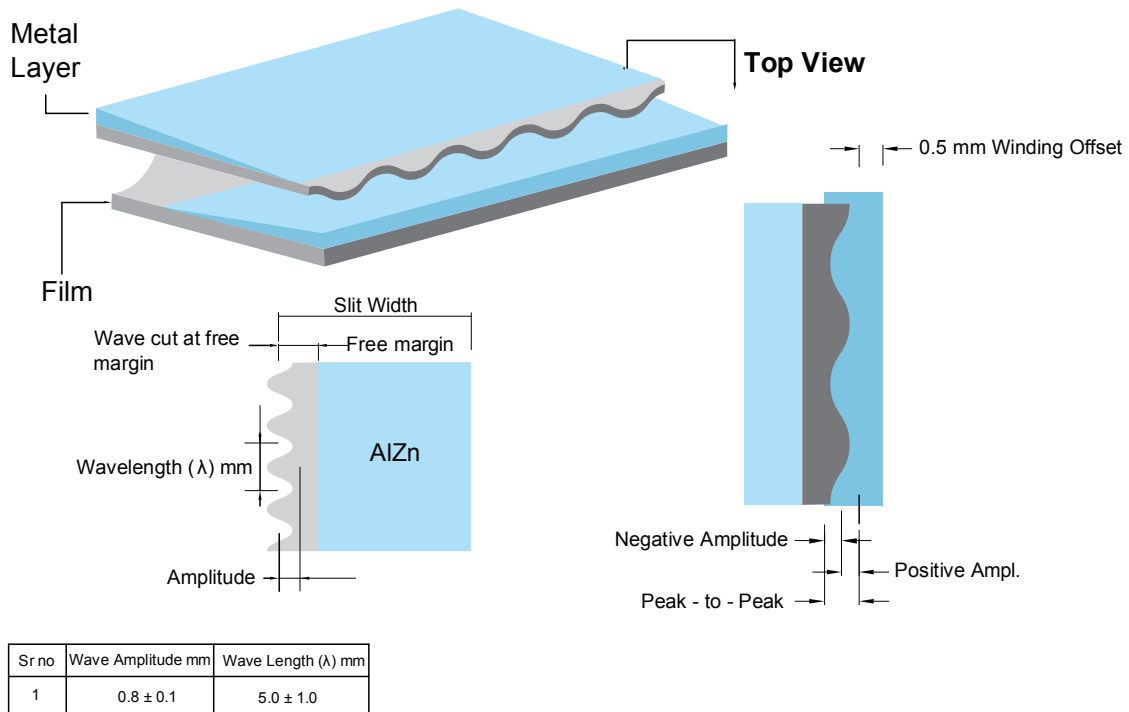
Available according to customer's design.

To get better **Self Healing Property**, it is recommended to use higher resistivity for Roll-1 than Roll-2

ZAMPP: AL-Zn METALLIZED POLYPROPYLENE FILM

(Wave Cut at Free Margin)

1. STRUCTURE



2. USED FOR HIGH VOLTAGE CAPACITORS

FINAL QA TESTING FACILITIES & EQUIPMENTS

1 Mechanical Inspection

- A Reel Width
- B Film Free Margin
- C Amplitude and Wave Length
- D Outer Diameter of Reel and Inner Diameter of Core
- E Thickness of BOPP and MPP Film by Micrometer
- F Reel Wobble Test

2 Electrical Inspection

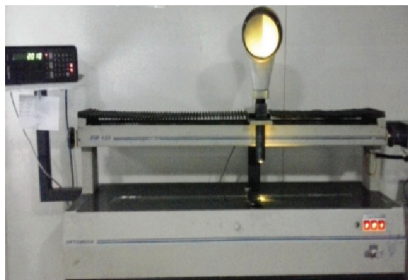
- A Active Area and Reinforced Edge Resistivity
- B Break Down Voltage Test of BOPP / MPP Film

3 Visual Inspection

- A Light source / Magnifying glass (10X) / Digital Micro-

1. Mechanical Inspection

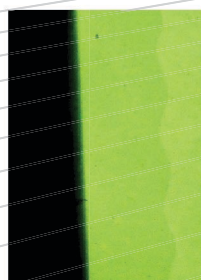
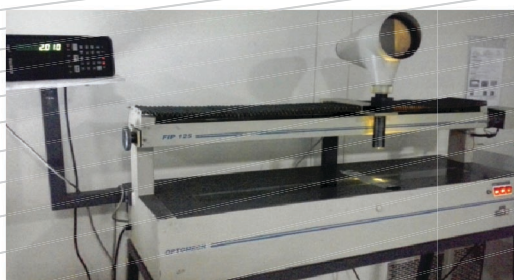
- A. Reel Width B. Film Free Margin



Instrument	Range	Least count	Specification
Vernier caliper	0 to 200mm	0.01 mm	$\pm 0.2 \text{ mm}$ $\pm 0.3 \text{ mm}$

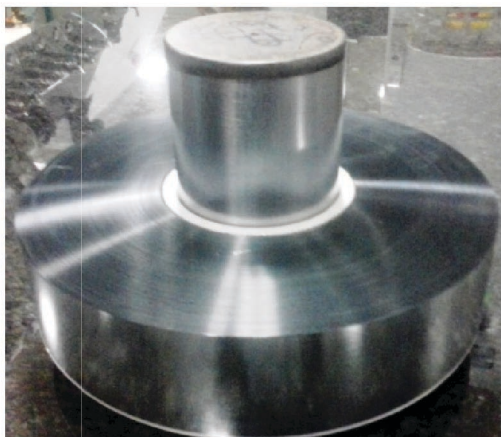
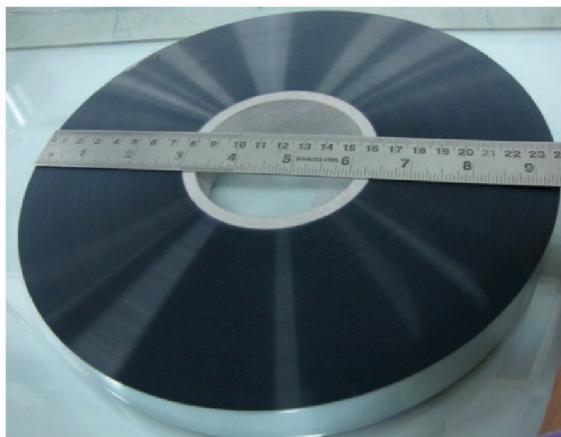
Instrument	Range	Least count	Specification
Profile Projector / Eye Glass (10 X)	0 to 1000 mm	0.001 mm	$1.5 \pm 0.3 \text{ mm}$
	0 to 20mm	0.01 mm	$2.0 \pm 0.4 \text{ mm}$
			$2.5 \pm 0.4 \text{ mm}$
			$3.0 \pm 0.4 \text{ mm}$
			$4.0 \pm 0.4 \text{ mm}$

C. Amplitude and Wave Length



Instrument	Range	Least count	Specification
Profile Projector	0 to 1000 mm	0.001 mm	Amplitude $0.8 \pm 0.1 \text{ mm}$ Wave Length $5.0 \pm 1.0 \text{ mm}$

D. Outer Diameter of Reel and Inner Diameter of Core



Instrument	Range	Least count	Specification
Measuring Scale	0 to 500 mm	1.00 mm	0 to 330 mm

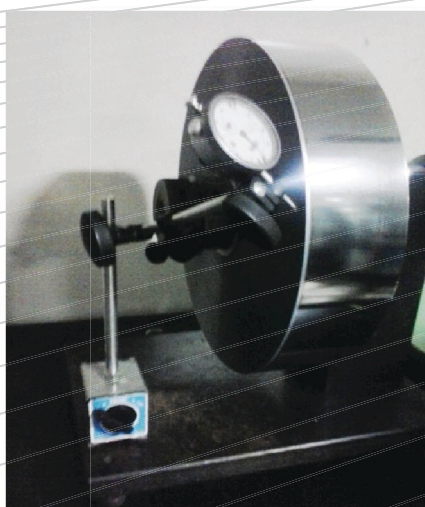
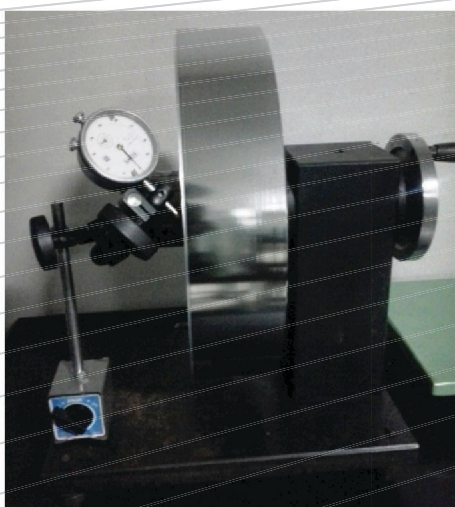
Instrument	Range	Least count	Specification
Go Gauge / Vernier caliper	74.58mm	NIL	Core 75 mm (+1 - 0.5mm)

E. Thickness of BOPP and MPP Film by Micrometer



Instrument	Range	Least count	Specification
Micro meter	0 to 25 mm	0.001 mm	Thickness $\pm 5\%$

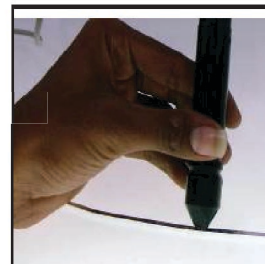
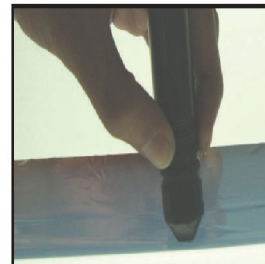
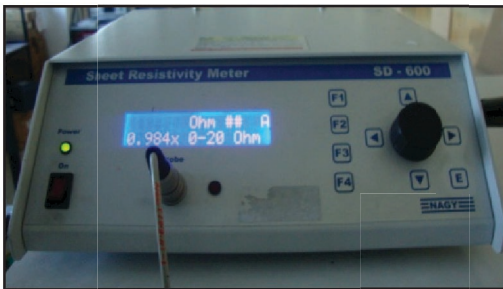
F. Reel Wobble Test



Instrument	Range	Least count	Specification
Dial Gauge for Wobble Test	0 to 10 mm	0.01 mm	< 0.5 mm

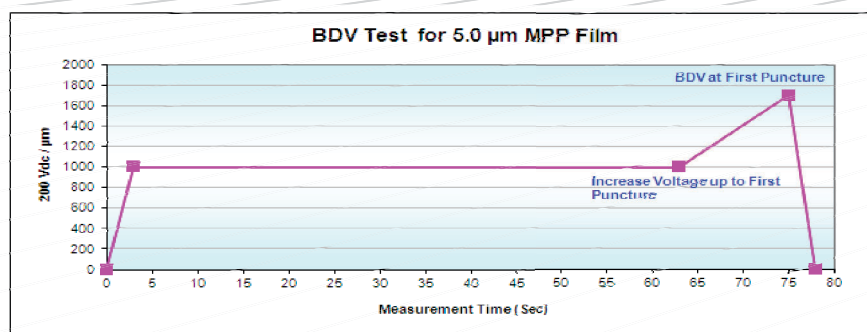
2 Electrical Inspection

A. Active Area and Reinforced Edge Resistivity

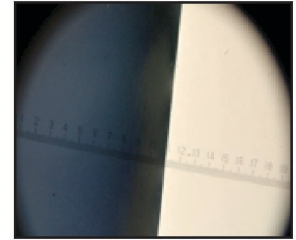
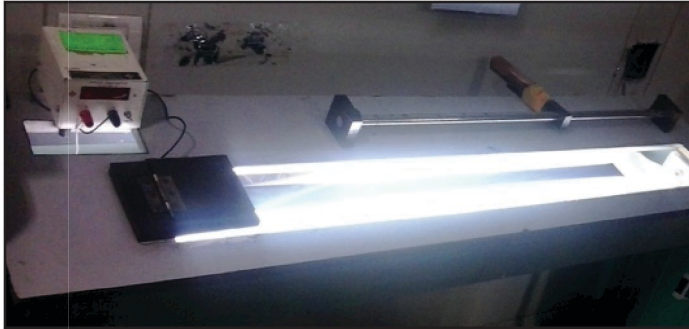


Instrument	Range	Least count	Specification
Sheet Resistivity meter (Make: Nagy)	0 to 200 K/ Ω	NIL	Surface Resistivity 5 to 10 Ω - STD Met
			Surface Resistivity 16 to 30 Ω – RMF Met
			Reinforced Edge Resistivity < 4.0 Ω

B. Break Down Voltage Test of BOPP and MPP Film



3 Visual Inspection



Instrument	Parameter
1. Light table	Winding finish
2. Magnifying glass (10X)	Wrinkles
3. Digital Microscope	Scratches
	Weak metallization
	White dots
	Dark free margin
	White ring

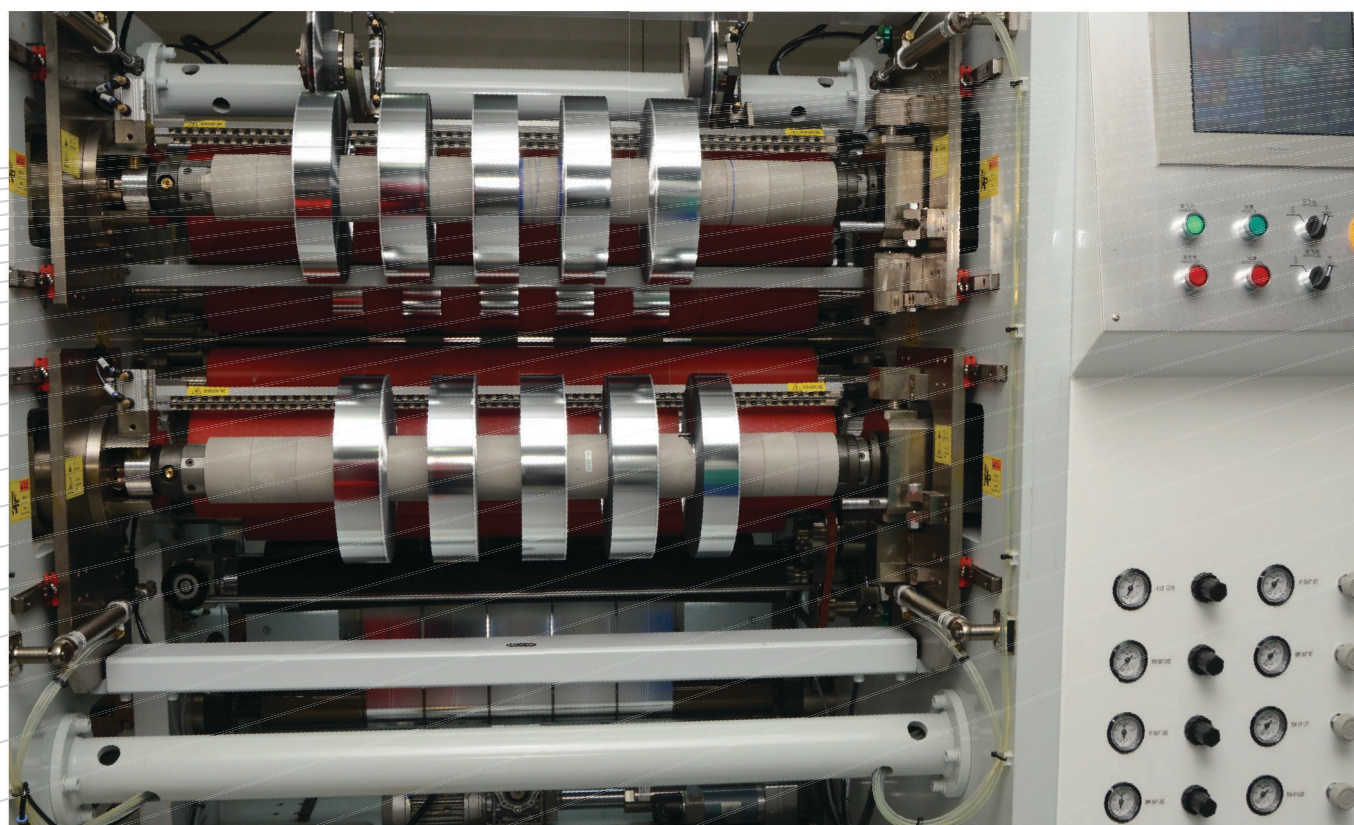
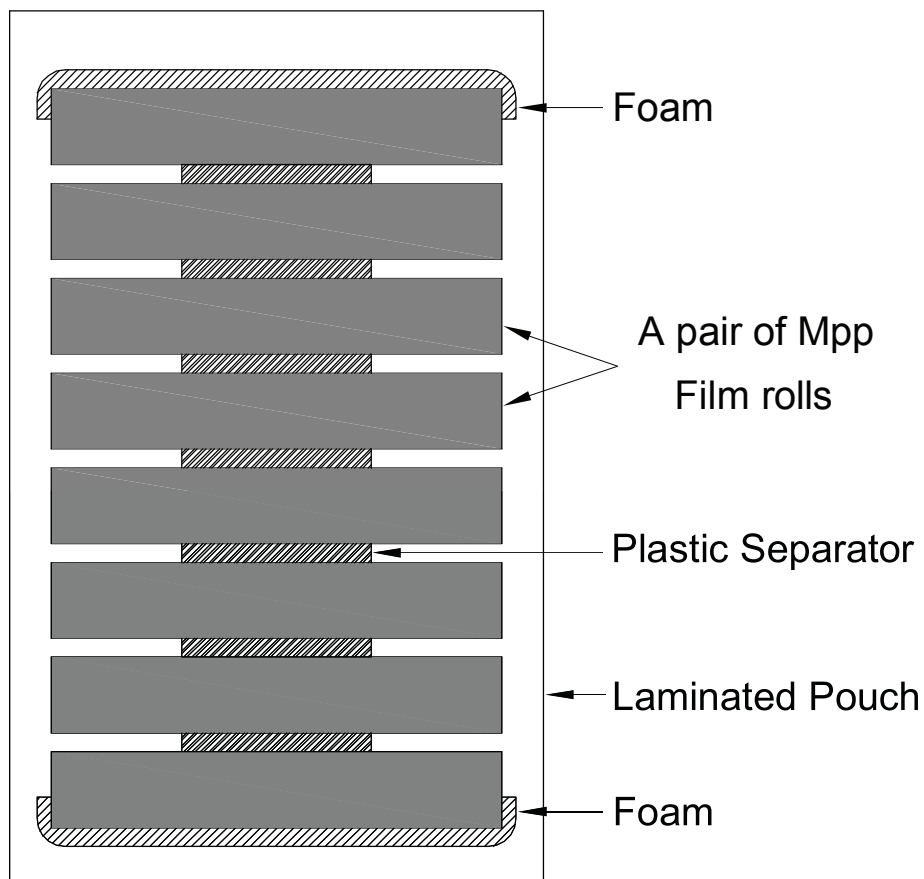


Lables

MPP Film Bag / Box Label

Tibrewala Electronics Ltd.		
Customer Name/Part No.		
Thickness (μm)	Width (mm)	Margin Width (mm)
Gross wt (Kg)		
Net wt (Kg)		
Date of mfg:		
Batch no:	Bag no:	

Inner Packing Of MPP Film

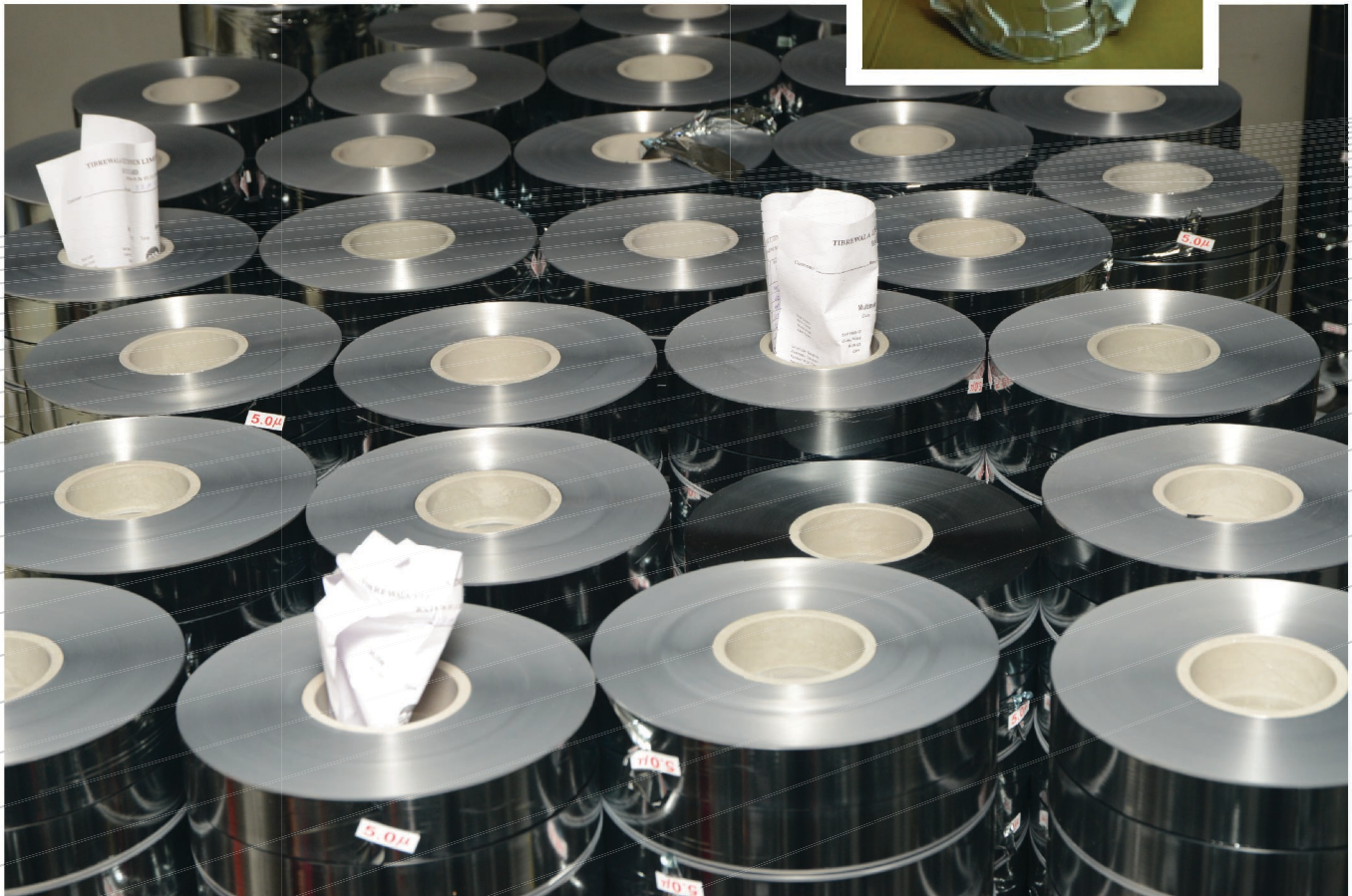


Packing & Storage

Each roll is marked with its own batch no. and is always packed in pairs. Right and Left rolls are differentiated from different colors of labels (Red & Green). Stacked Pairs of Rolls are put in Aluminium Foil Laminated Bags under vacuum to provide protection from various external atmospheric conditions.

The vacuum sealed bags are then labeled accordingly and packed in individual cartoon boxes and palletized as per the requirement of the customer.

It is recommended to store TIBCON MPP under the humidity and temperature below 60% and 23°C, respectively. TIBCON MPP should be stored in its original packing and unused open material should be repacked using dry sealing agent and be tried to use as soon as possible.





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