Accu Tech Plastics, Inc.
1353 International Drive
Eau Claire, WI 54701 USA

Test standard of material characteristic

TAPPI: Technical Association of the Pulp and Paper Industry
JIS: Japanese Industrial Standard
ASTM: American Standard Test Method
KS: Korea Standard

Item	Unit	TAPPI	JIS	KS	ISO
Base weight	g / m²	T 410	P 8124	M 7013	D-102
Thickness	um	T 411	P 8118	M 7021	D-103
Density	g / cm³	T 411	P 8118	M 7021	D-103
Internal bond	ft.lbfx10-3/in2 (scott)	T 541			D-105
Stiffness	Mgf	T 489	P 8125		D-106
Tensile strength	kgf/mm	T 404	P 8113	M 7014	D-115
Smoothness	mℓ	T 479	P 8119	M 7028	D-108
Surface strength	A	T 459		M 7050	D-109
Size	g / m2			M 7122	D-107
Ash	%	T 413	P 8128	M 7022	D-113
Moisture	%	T 412	P 8127	M 7023	D-104
pH	pH		P 8133	M 7053	D-114

The below specification is all based on the ISO standard and KS

Item	Board Tape (0.75T)	Unit
Base weight	620±50	g / m²
Thickness	0.75±0.05	pm
density	0.85±0.05	g / cm²
Internal bond	140↑	ft.lbf*10-3/in2(SCOTT)
Stiffness	1100↑	mgf
Tensile strength	4.5↑	kgf/mm
Smoothness	150~250	mℓ / min
Surface strength	14↑	A
Size	20~50	g / m²
Ash	2↓	%
Moisture	7.5±1.5	%

pH	7~8	pH

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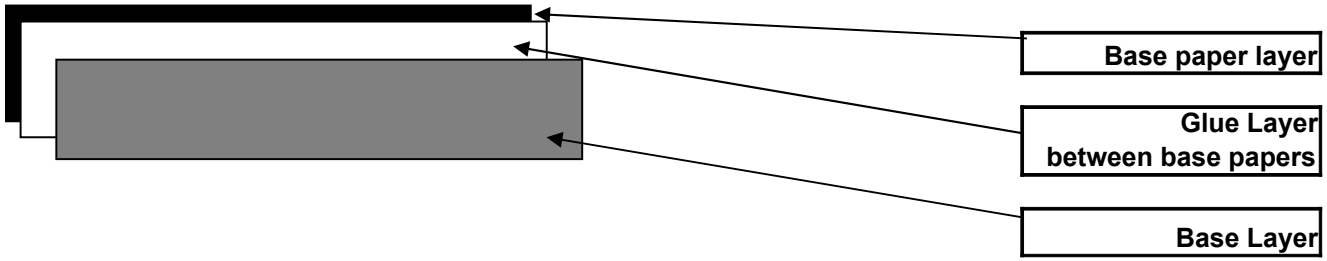
Carrier Board tape Quality Control

Item		Related check-point	Remark
Appearance	Surface		Made from raw materials including Pulp and dyestuff
	Burr (Dust)	Density, Internal Bond, Stiffness, Ash	
Elasticity		Density, Tensile Strength, Tearing Strength	Elasticity of "Thickness" direction
Pich gap		same as the above	Elasticity of "Width" direction
Bending		Internal bond, Tensile strength, Tearing strength, Stiffness	Strength of products
Bonding strength		Density, Internal Bond, Tensile strength, Surface strength	
Taping adhesive strength		Smoothness, Surface strength, size	



1. ATP carrier board tape is compounded with glue layer in between 2 base paper layers. However, 0.43T is made of 1 layer base paper only.
2. The thickness of the glue layer does not affect to the whole size in products.
3. ATP carrier board tape is made from all Bleached Kraft Pulp.
4. The main ingredients of glue consist of general synthetic binder from PVAc (Poly Vinyl Acetate).

* No inorganic compound like Caco3 is used in the whole process,

so that it incomparably minimizes the level of abrasion to the punching drill.

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ATP Carrier Board Tape vs. Japan Products - Test Results

Transformation test from moisture and temperature changes

Test conditions & methods

1. Temperature: 40 degree Celsius
2. Moisture: 90RH%
3. Testing time: 168 hours

Formula of the test: (the former - the latter)/the former * 100%

Test sample list

Item	A	B	C	D	E	F
Grammage	JAPAN 648gsm	JAPAN 809gsm	ATP 644gsm	ATP 644gsm	"A" Sample punched	"C" Sample punched

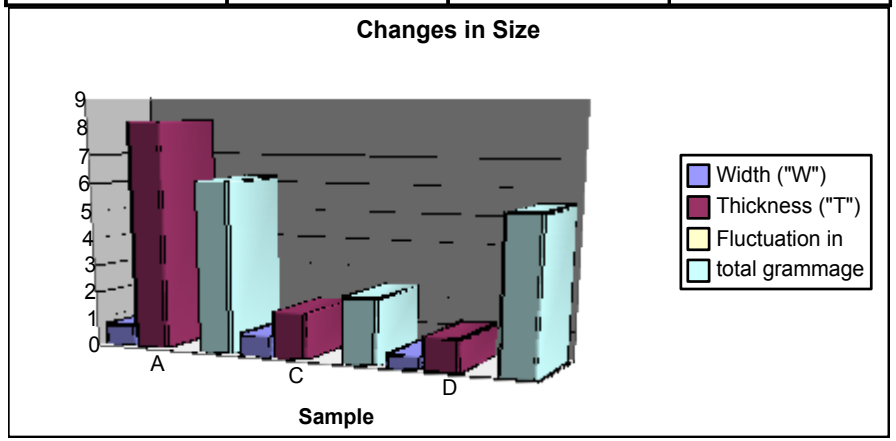
Test Result

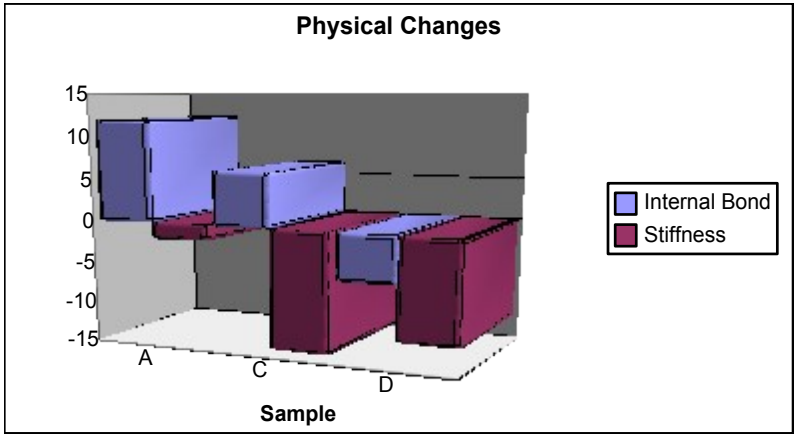
1. Variation in different moisture content

Item	A	B	C	D	E	F
Width ("W")	0.8	0.5	0.8	0.5	0.2	0.4
Thickness ("T")	8.2	5.7	1.7	1.2	6	4.2
Fluctuation in total grammage	6.2		2.4	5.5		

2. Variation in Physical properties

Item	A	C	D
Internal Bond	11.9	6.3	-5.4
Stiffness	-1.8	-14.2	-11.9





* Physical changes in Internal Bond & Stiffness turned out to be better for ATP brand than the Japan Products.

* Judging from this test result, ATP carrier board tape is quite reliable and good at longer storing-efficiency than the Japan Products.

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Chemical Inspection Result

1. Chip efficiency test report

Test Sample	Test Place	Storin Time	Test Date	Decision
CR	LG Electronics	8 months	1996	O.K.
MLCC	Samsung Electronics	8 months	1996	O.K.
CC & CR	Samsung Electronics	2 years	2001	O.K.

2. Sulfur Acid (SO4) & KMnO4 content analysis

Item	S (ppm)	SO4 (ppm)	Mn (ppm)	KMnO4 (ppm)
ATP Carrier Board Tape	220	660	0.8	2.43
JIS		900		n/a

3. Surface resistance data (September 2001) (Unit: 1,000,000Ω(

Item	JIS	ATP Carrier Board Tape
Surface resistance	$2*10^{10}\Omega$	$3\sim5xe^{10}\Omega$ (e=2.718)

* The test result shows that the figure of ATP's is far lower and better to the occurrence of static electricity.

Storage Conditions

1. The product must be protected under the conition s of the package perscriber.
2. The product must be protected from high temperature and excessive humidity and kept away from direct exposure to list.

(Condition for Protection: Temp: 18 + 5 degrees Celcius Humidity 60 + 15% RH