

metastar® 民士达

Core Competence

Company Strengths &
Competitive Advantages





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LETTER OF AUTHORIZATION

By this letter, we state that Resistance Alloys Impex LLP with address 1-A Chemox House, 1st Floor, 7 Barrack Road, Mumbai – 400 020, India is our **Comprehensive Strategic Collaboration Partner in India** to sell and promote all products made by Yantai Metastar Special Paper Co. Ltd., China.



Yantai Metastar Special Paper Co.,Ltd

We are pleased to announce
that we have formally
authorized
Resistance Alloys Impex LLP
as our Comprehensive
Strategic Collaboration
Partner in India.



CONTENT



**Full Industrial
Chain
Scale Advantage**



**Breakthrough
Product
Capabilities**



**Perpetual
Innovation
Momentum**



**Customer-Focused
Service
Ecosystem**

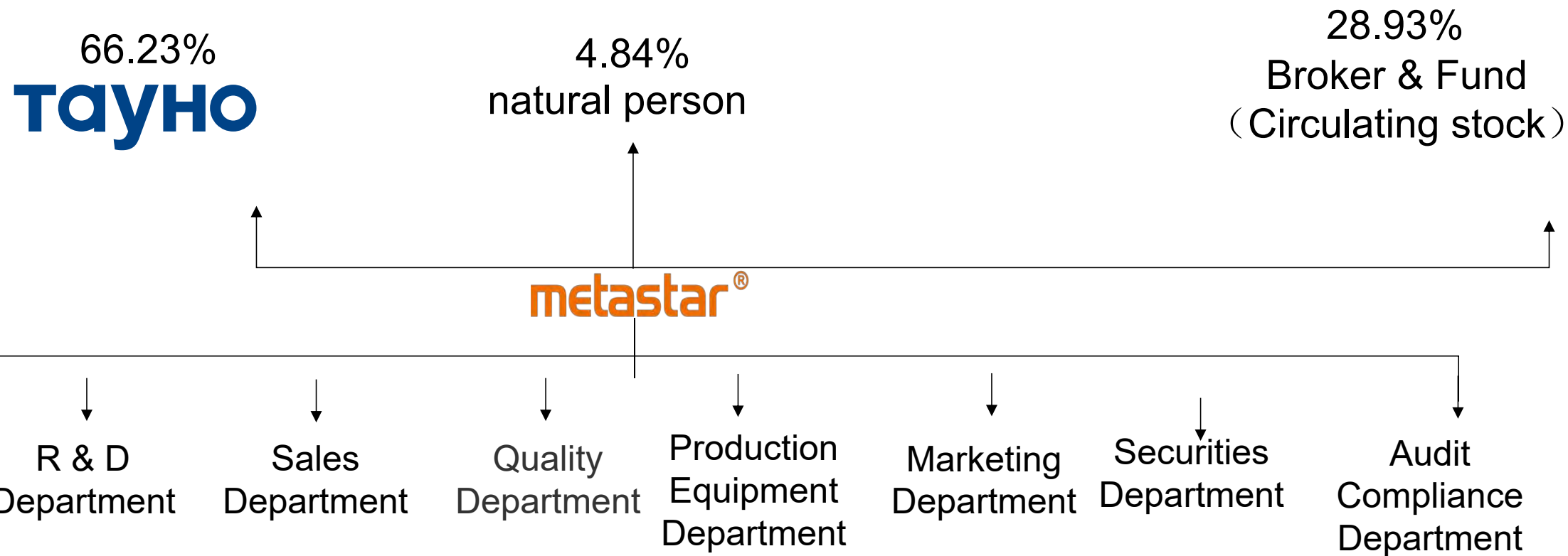
The background of the slide is a photograph of a modern, multi-story glass building. The building has a prominent glass facade and a large, dark, rectangular feature on its side. The sky is blue with some clouds. In the foreground, there is a road with a few cars and some greenery. The text '01' is overlaid in a large, orange, sans-serif font, and 'PART ONE' is overlaid in a smaller, white, sans-serif font.

01

PART ONE

Full Industrial Chain Scale Advantage

1.1 SHAREHOLDING & ORGANIZATIONAL STRUCTURE



1.1 TAYHO INTRODUCTION

- Established in 1987: It is a public company in A share capital market, stock code: 002254.
- Industrial Parks: It has two industrial parks in Yantai and Ningxia, covering an area of 984,000 m², with more than 3,000 employees.
- Assets: The total assets amount to 10 billion yuan, with 16 affiliated enterprises and excellent asset quality.
- Industry Pioneer: It is the pioneer and industry benchmark for high-performance fibers such as spandex, meta-aramid, para-aramid in China.
- Research Center: It has the National Aramid Engineering Technology Research Center.

Tayho Group
(Shenzhen
Stock Exchange)

Metastar
(Beijing
Stock Exchange)

Tayho

1.1 TAYHO BUSINESS SEGMENT

5 products ranked
first globally

2 products ranked
second globally

2 products ranked
third globally

1 products ranked
fifth globally

Advanced Textile
Industry
Group

Newstar



Inaugurator in CN\World No.5

Ecody



Inaugurator in the world

Bio-based
aramid



Inaugurator in the world

Regenerated
fiber



Inaugurator in the world

Safety Protection and
Information
Technology Industry
Group

Tametar



Inaugurator in CN\World No.2

Taparan



Inaugurator in CN\World No.3

New Energy Industry
Group

Metastar



Inaugurator in CN\World No.2

LITME



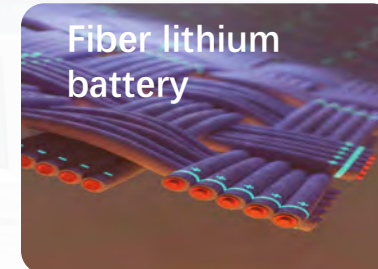
Inaugurator in the world

Safebm



Inaugurator in CN\World No.3

Fiber lithium
battery



Inaugurator in the world

Chemical Industry Group

1.1 APPLICATION



Textile and Apparel



Information and Communication



Aviation Industry



Emergency Rescue



Smart Wear



Safety Protection

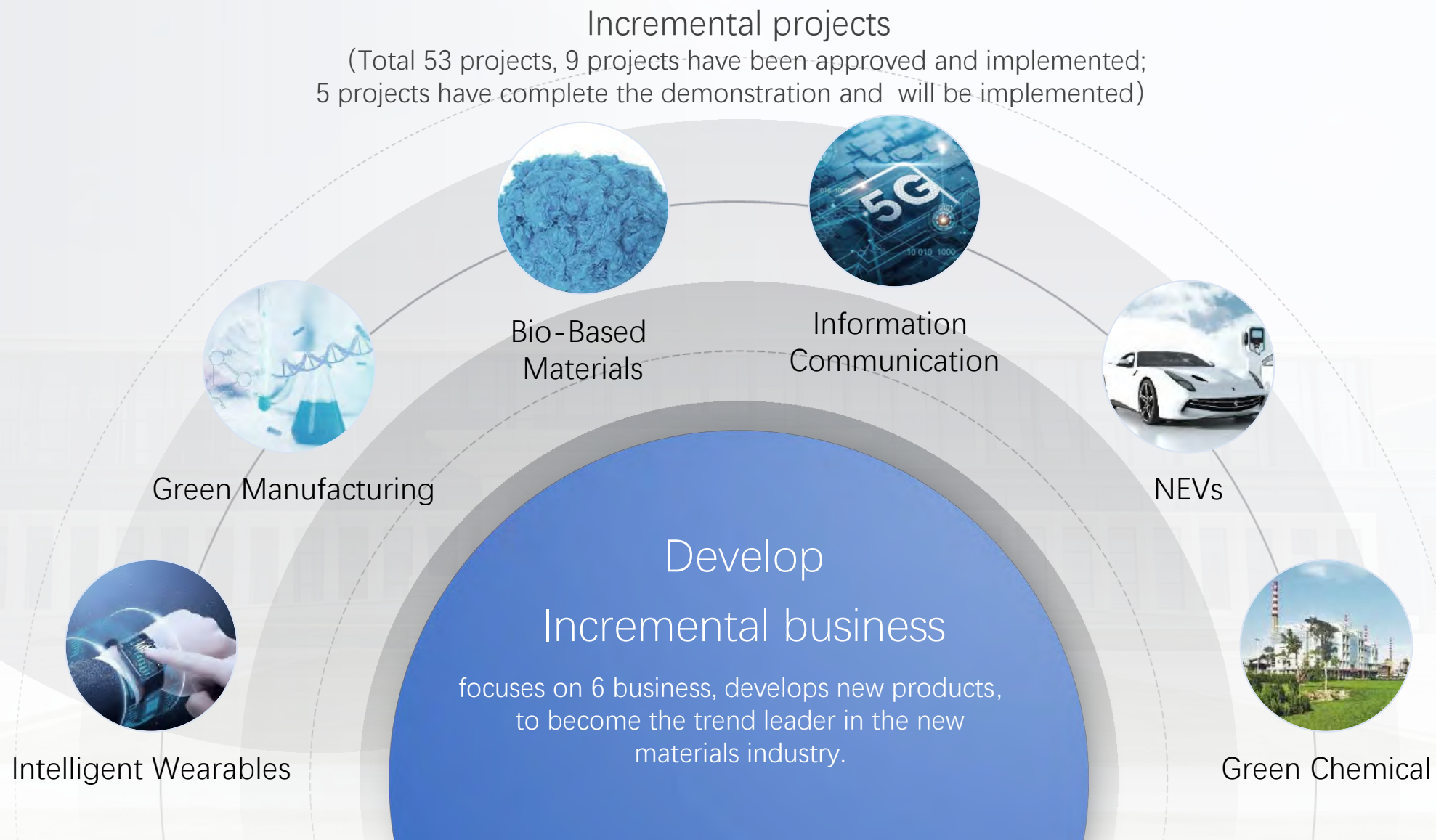


Environmental Protection



National Defense

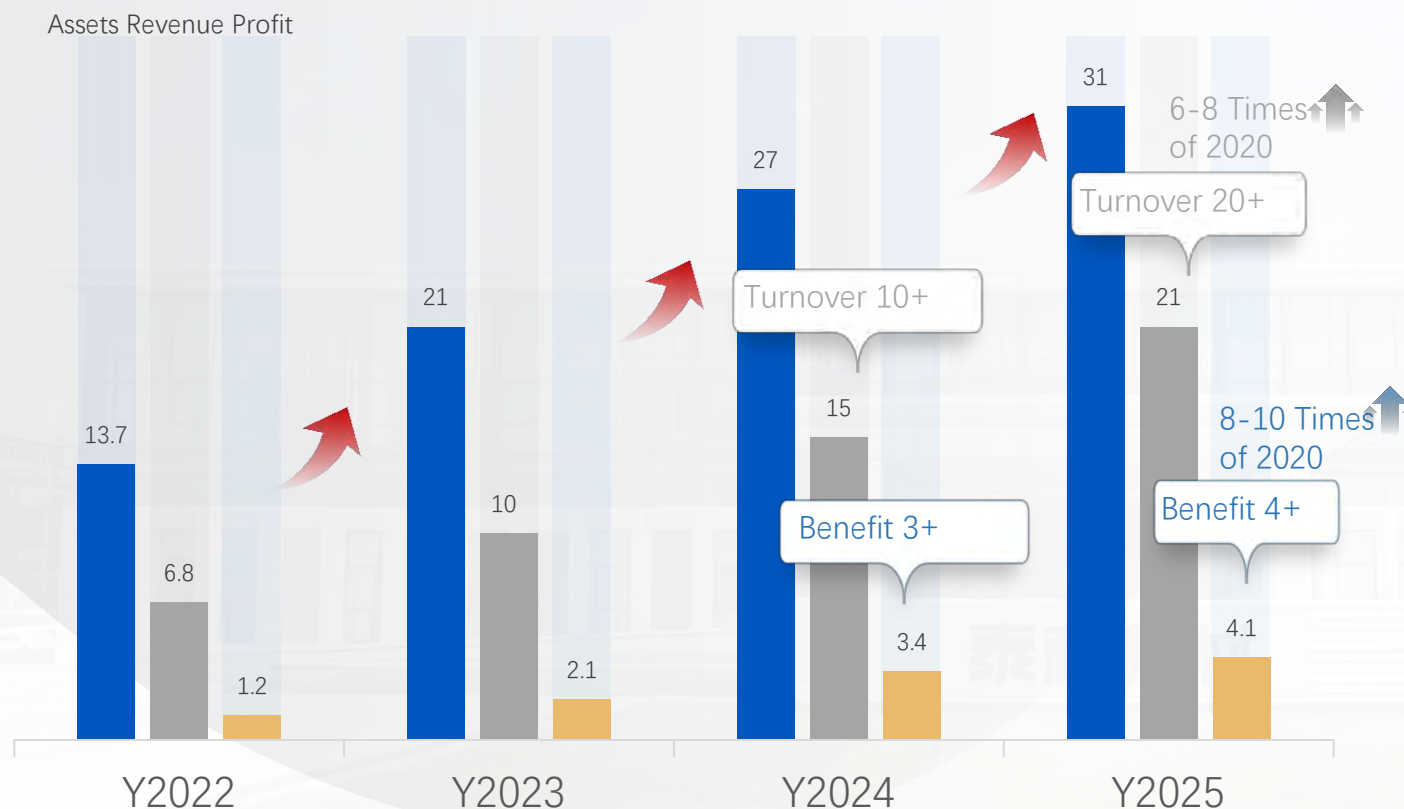
1.1 NPI PIPELINE



1.1 DEVELOPMENT GOALS

Development Forecast

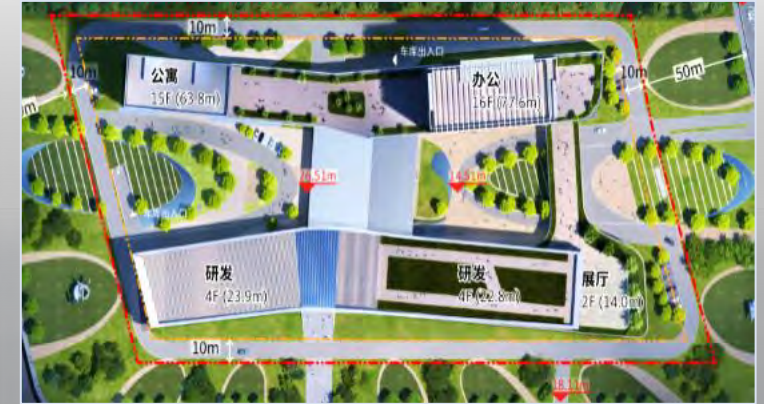
Unit: 100 million yuan



Development strategy
Talent leading, Innovation-driven

Focusing on
business improvement,
incremental business expansion,
industrial chain extension,
Realize "three-round of doubling plan" in terms of assets, revenue, and profit.

1.1 INNOVATION AND INCUBATION CENTER (BAJIAO)



10+ acres



“International standards and New image” oriented, it is a combination of R&D center, training center and administrative center.



1. 1 MACROMOLECULE NEW MATERIALS PARK (SEAPORT ZONE)



90+ acres

55 acres for 1st project, 35 acres for 2nd project



Positioning high-performance, difference and innovation, to build production base for special fibers, special paper and high performance film.

Special Fiber

- Spandex
- Meta-aramid
- Para-aramid

Special Paper

- Aramid Paper
- Flash Non-woven

High performance film

- Aramid lithium battery separator
- 5G communication flexible film
- 5G heat-conductive film



1.1 NINGXIA BASE



330 acres
150 acres for 1st project, 180 acres for 2nd project



Positioning “integration and dual circulation”, to expand the upstream and downstream industries of high performance fibers such as spandex and para-aramid.



1. 1 GREEN NEW MATERIALS INDUSTRIAL PARK (PENGLAI)



210+ acres
55 acres for 1st project, 35 acres for 2nd project



Positioning “green and low-carbon”, to build production base of green dyeing and finishing, bio-based fibers and fine chemicals.



Green Dyeing & Finishing

A revolutionary technology in the dyeing and finishing industry.



Seaweed Fibers

New eco-friendly functional green fiber.



Fine Chemicals

New high-safety battery electrolyte.



1.1 HIGH PERFORMANCE FIBER APPLICATION INDUSTRIAL PARK (AIRPORT ZONE)



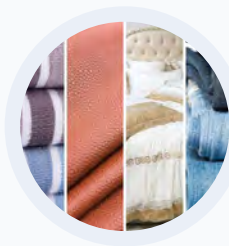
88 acres
32 acres for 1st project, 56 acres for 2nd project



Positioning “intelligence and industrial integration”, to build a production base of intelligent fibers, functional fabrics and functional clothing, to expand industrial chain of aramid fibers.



SMART FIBER



FUNCTIONAL
FABRICS



FUNCTIONAL
CLOTHING



1.1 SPECIAL FIBER APPLICATION INDUSTRIAL PARK (SONGSHAN)



Focusing on “EVs and PPE”, to build aramid yarn / fabric, insulation materials and honeycomb core production base.



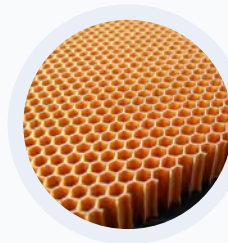
To offer all-in-one solution for EVs and PPE.



ARAMID YARN
& FABRICS



INSULATING
MATERIALS



HONEYCOMB
CORE



1.2 Seamless Production Process

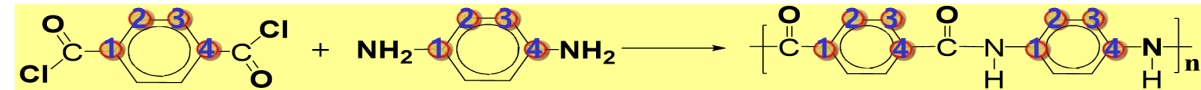
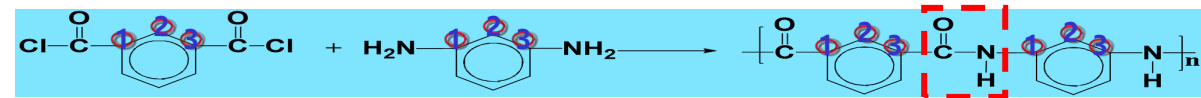
With Scale advantage, solid industrial foundation and complete industrial chain, we ensure seamless production from chemical material to aramid paper and finished products.



Chemicals

Acid chloride+MPD/PPD

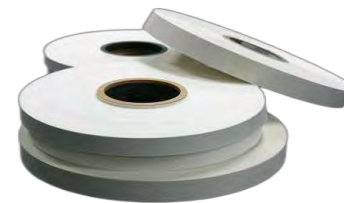
Two dedicated production lines exclusively guarantee continuous raw material supply.



Fiber

Fiber dedicated production line, no polymer material switching, avoiding the risk of and component fluctuations, raw materials quality is controllable and stable.

Paper



Total annual capacity of

4,500 tons.

Lamination
Pressboard&Strips
Crepe pape



9 Types

33 Specifications

1.3 Dedicated Fiber Production Lines

Two dedicated production lines exclusively guarantee continuous raw material supply.

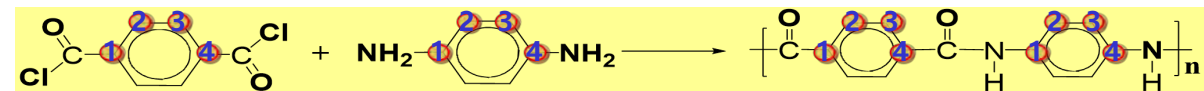
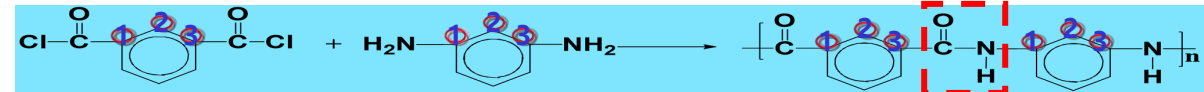
Exclusive fiber production line, no polymer material switching, avoiding the risk of component fluctuations, raw materials quality is controllable and stable .



Chemicals

Acid chloride+MPD/PPD

Fiber



1.4 Adequate Capacity and Diversified Downstream Products

Scale advantage, solid industrial foundation and complete industrial chain translates into a robust capacity of 4,500 tons and 9 types, 32 specifications of diversified downstream derivatives, such as Lamination, Pressboard&Strips, Crepe paper and DDP.



1.4 Adequate Capacity and Diversified Downstream Products

Type	Other supplier	Metastar
Pressboard low Density	T-992	YT592
Pressboard Medial Density	T-993	YT593
Pressboard High Density	T-994, T-994 NPT	YT594
Uncalendered	T-411	YT511
calendered with Mica(50%)	T-818 (418)	YT518
UnCalendered Mica Paper(50%)	T-819 (419)	Developing
calendered with Mica(50%)	T-864LAM	YT568
UnCalendered Mica Paper(5%)		YT-CM,YT-UM
Calendered Electric Pure Paper	T-410, T-414,	YT510, YT516, YT510W
Calendered Medium density	356 (E56)	YT56
Calendered Lam Paper	T-416 Lam, T-464 Lam	YT564
Calendered Lam paper (low cost)	Metamax130 (AR30)	YT564S (canceled)
Calendered Wrapping paper	T-926,	YT516, YT516S
Calendered Pure Paper Low Cost	T-406 (306), 358(464)	YT516 S
Calendered Electronic paper	T-358	YT516
Calendared Paper	N-750(250)	YT516
Calendared paper	N-756(256)	YT516
Crepe Paper	T411, T410	YT511C, YT510C
Honeycomb Core Meta-paper	T412	YT812/YT822A
Honeycomb Core Meta-paper	T722	YT822
Honeycomb Core Para-paper	N636	YT836
Conductive carbon blend Paper	843	YT543

1.4 Adequate Capacity and Diversified Downstream Products

			Type	Nominal Thickness (mm)
1	Meta aramid Paper	Calendared	YT510	0.05、0.08、0.13、0.18、0.25、0.30、0.38、0.51、0.76
2			YT516	0.025、0.05、0.08、0.13、0.18、0.25、0.30、0.38、0.51、0.76
3			YT564	0.04、0.05、0.08、0.13
4		Semi-Calendared	YT56	0.13、0.18、0.25、0.30、0.38、0.51、0.61、0.76
5		Uncalendared	YT511	0.13、0.18、0.25、0.38、0.58
6	Crepe aramid paper		YT510C & 511C	0.05、0.08、0.13 & 0.13、0.18
7	Diamond Dotted aramid paper		YT510D	0.05、0.08、0.13、0.18、0.25、0.30、0.38、0.51、0.76
8	Meta aramid pressboard		YT592	1.6、3.2
9			YT593	1.0、1.5、2.0、2.4、3.0、4.0、5.0、6.0
10			YT594	1.0、1.5、2.0、3.0、3.3、4.0、4.8、6.0、6.4、8.0、9.6
11	Aramid mica paper	Calcined	YT-CM	80、120
12		Uncalcined	YT-UM	80、120

1.4 Adequate Capacity and Diversified Downstream Products

		Type	Nominal Thickness (mm)	Application
13	Aramid mica tape	YT-CM-A005	0.12	Traction Motor
14	Aramid Felt	YT7540	2.5、 5.0	Traction Motro
15	High stiffness paper	YT510 (w)	0.13、 0.18、 0.22、 0.25、 0.30、 0.38、 0.51、 0.76	EV Motor
16	Honeycomb Paper	YT822A	0.04, 0.05, 0.08, 0.10	Airplane
17		YT822	0.04, 0.05, 0.08, 0.10	High speed train
18		YT836	0.04、 0.05、 0.08、 0.10	Airplane
19	50% Aramid mica paper for insulation	YT518	0.05,0.08 ,0.13,0.18,0.25	Offshore wind power
20	50% Aramid mica paper for Laminate	YT568	0.05 0.08	
21	High flame retardant paper	—	0.15	
22	Carbon fiber aramid paper for honeycomb	YT843	0.05	
23	Carbon fiber aramid paper for insulation	YT543	0.05	
24	Electromagnetic aramid paper	YT853	0.04、 0.05	
25	Conductive aramid paper	YT862	0.06	
26	Low dielectric aramid paper	YT873	0.05	
27	XX insulation paper	YT562	0.05 (in developing)	20



02

PART TWO

Breakthrough Product Capabilities

2.1 Fluorine-free and Low-halogen



100% Aramid without additive, green and pollution-free, fluorine-free and low-halogen.

2.2 Superior Heat Resistance Performance

Flame retardant properties

Metastar

- Full thickness flame retardant
- Flame retardant certification V-0/VTM-0
- UL Monomer Certification E331406

Foreign Products

- Non-full thickness flame retardant
- No flame retardant certification for thickness below 0.102mm

Component - Plastics								E331406
Guide Information								
YANTAI METASTAR SPECIAL PAPER CO LTD								
1 EMAISHAN RD, ECONOMIC & TECHNOLOGY DEVELOPMENT ZONE, YANTAI SHANDONG 264006 CN								
YT516, YT510								
Meta-Aramid Paper "METASTAR", furnished as rolls								
<u>Color</u>	<u>Min. Thk (mm)</u>	<u>Flame Class</u>	<u>HWI</u>	<u>HAI</u>	<u>RTI Elec</u>	<u>RTI Imp</u>	<u>RTI Str</u>	
NC	0.025	VTM-0	4	4	-	-	-	
	0.05	VTM-0	4	4	210	-	210	
	0.08	VTM-0	4	4	210	-	210	
	0.10	VTM-0	4	4	210	-	210	
	0.13	VTM-0	4	4	210	-	210	
	0.18	VTM-0	4	4	210	-	210	
	0.25	V-0	4	1	210	-	210	
Component - Plastics								E34739
Guide Information								
DuPont Specialty Products USA, LLC								
Nomex Business Center, 5401 Jefferson Davis Hwy, North Chesterfield VA 23234								
464, 464 LAM								
Aramid Insulating Paper "Nomex®", furnished as sheets								
<u>Color</u>	<u>Min. Thk (mm)</u>	<u>Flame Class</u>	<u>HWI</u>	<u>HAI</u>	<u>RTI Elec</u>	<u>RTI Imp</u>	<u>RTI Str</u>	
NC	0.038	-	-	-	200	-	200	
	0.051	-	4	3	200	-	200	
	0.076	-	4	2	200	-	200	
	0.102	-	4	2	200	-	200	
DuPont Specialty Products USA, LLC								
Nomex Business Center, 5401 Jefferson Davis Hwy, North Chesterfield VA 23234								
410								
Aramid Insulating Paper "Nomex®", furnished as sheets								
<u>Color</u>	<u>Min. Thk (mm)</u>	<u>Flame Class</u>	<u>HWI</u>	<u>HAI</u>	<u>RTI Elec</u>	<u>RTI Imp</u>	<u>RTI Str</u>	
NC	0.051	-	0	3	220	-	220	
	0.076	-	0	3	220	-	220	
	0.102	VTM-0	0	3	220	-	220	
	0.120	V-0	0	1	220	-	220	
	0.180	V-0	0	1	220	-	220	
	0.254	V-0	0	0	220	-	220	
	0.305	V-0	0	0	220	-	220	
	0.380	V-0	0	0	220	-	220	
	0.508	V-0	0	0	220	-	220	
	0.610	V-0	0	0	220	-	220	
	0.760	V-0	0	0	220	-	220	

2.2 Superior Heat Resistance Performance

CENT-QR2407-2019
page 1 of 1

MA 110000220232 IAC-MSA CNAS 中国合格评定国家认可委员会
TESTING CNAS L2021 No: 2019-715

TEST REPORT

Name of sample: ARAMID PAPER

Client: Yantai Metastar Special Paper Co., Ltd.

Classification of test: Commission test

Electrical Materials Testing Center of Supervision and Testing Center of Machinery Industry of China

➤ **0.05mm** aramid paper mechanical properties
temperature resistance index **226.9°C**

➤ **0.05mm** aramid paper electrical properties
temperature resistance index **221.6°C**

CENT-QR2410-2019
page 1 of 1

MA 110000220232 IAC-MSA CNAS 中国合格评定国家认可委员会
TESTING CNAS L2021 No: 2019-715

TEST REPORT

Name of sample: ARAMID PAPER

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Classification of test: Commission test

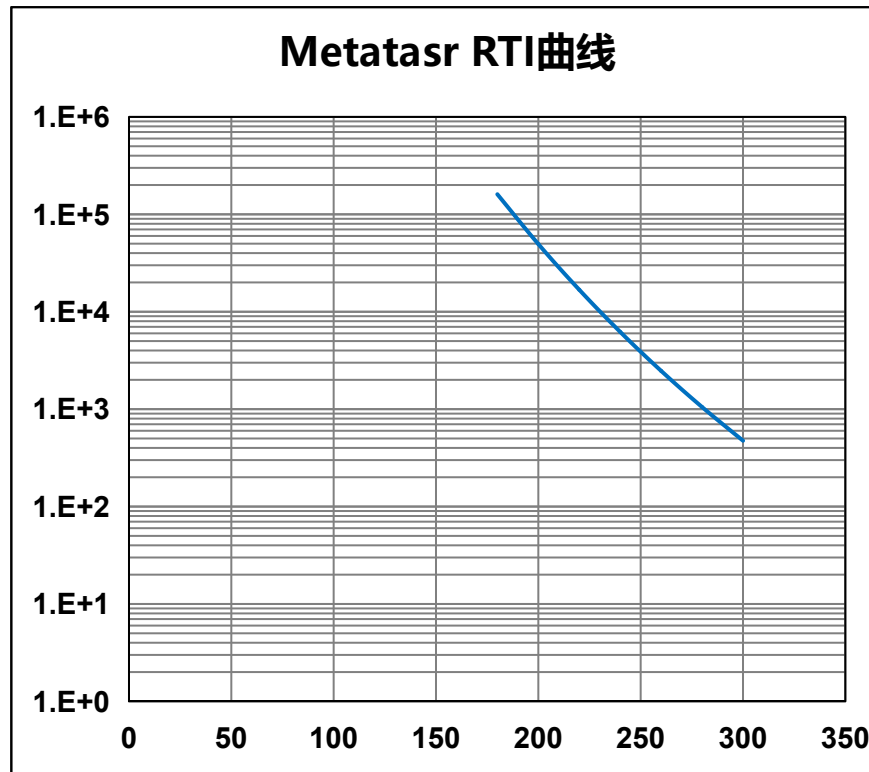
Electrical Materials Testing Center of Supervision and Testing Center of Machinery Industry of China

➤ **0.25mm** aramid paper mechanical properties
temperature resistance index **229.1°C**

➤ **0.25mm** aramid paper electrical properties
temperature resistance index **227.3°C**

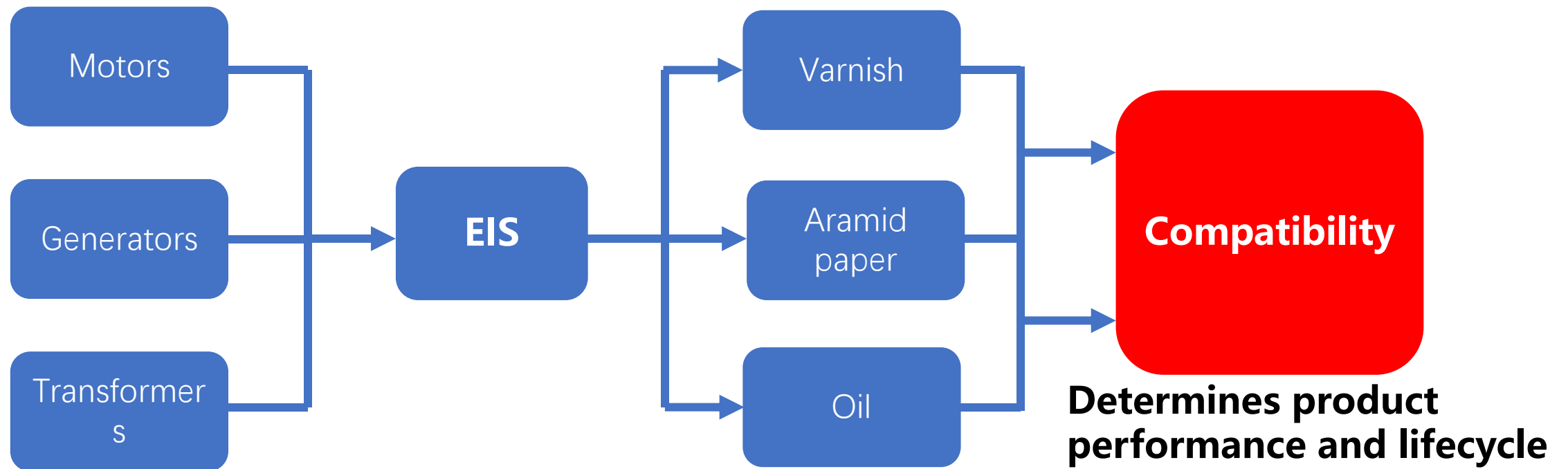
2.2 Superior Heat Resistance Performance

➤ High Temperature Resistance



- ✓ UL certified temperature resistance of 216°C;
- ✓ Temperature of Initial decomposition 415°C, resistant to short-term high temperature;
- ✓ Aramid paper can work **continuously** for more than **832146 hours (95 years) at 155°C;**
- ✓ Aramid paper can work continuously for more than **163794 hours (20 years) at 180°C.**
- ✓ UL monomer certification: E331406UL
- ✓ Insulation system: E483585

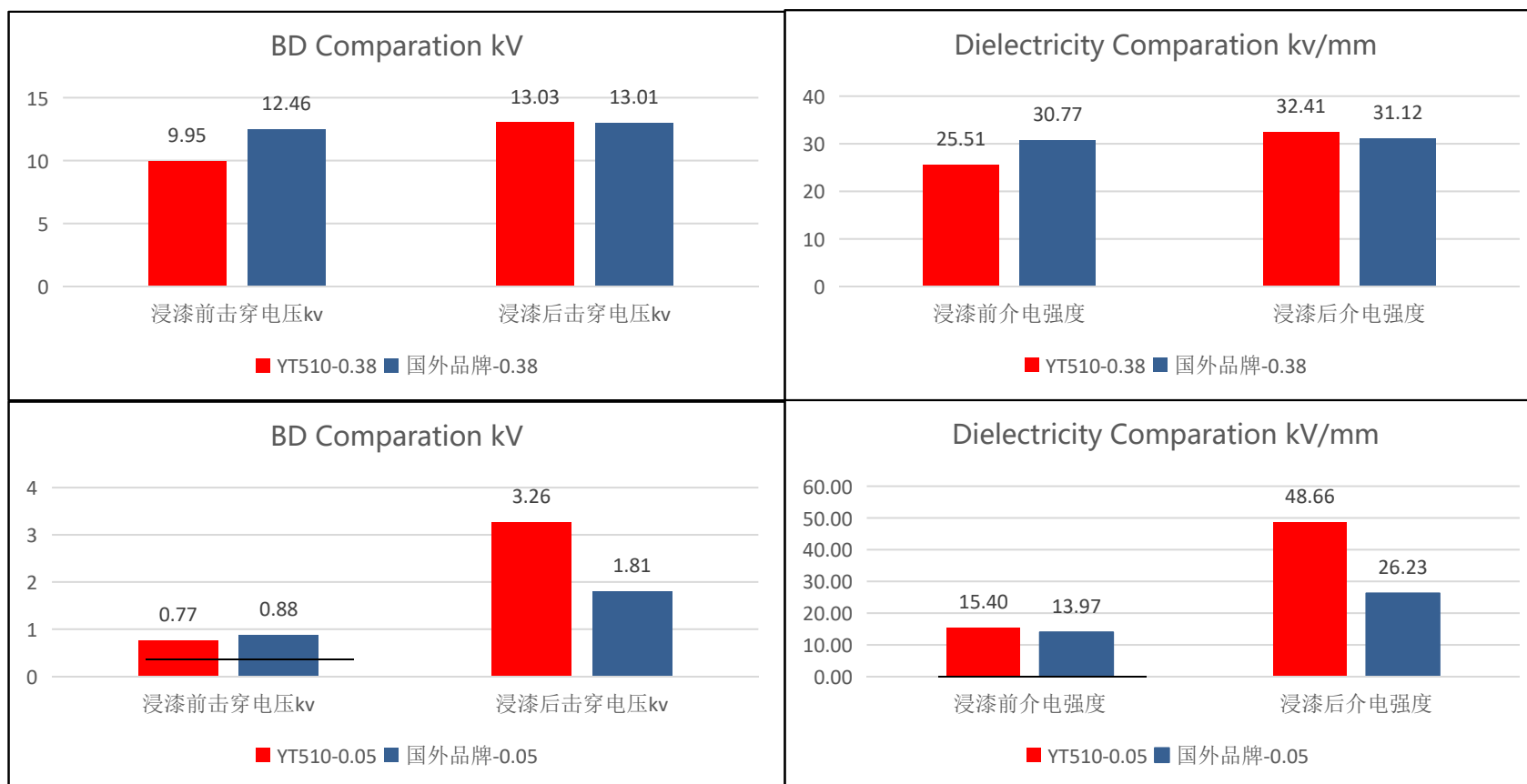
2.3 Superior EIS Performance



2.3 Superior EIS Performance

➤ Insulating varnish compatibility

Dielectric strength comparison for YT510-0.38, YT510-0.05 vs foreign products before and after Impregnation

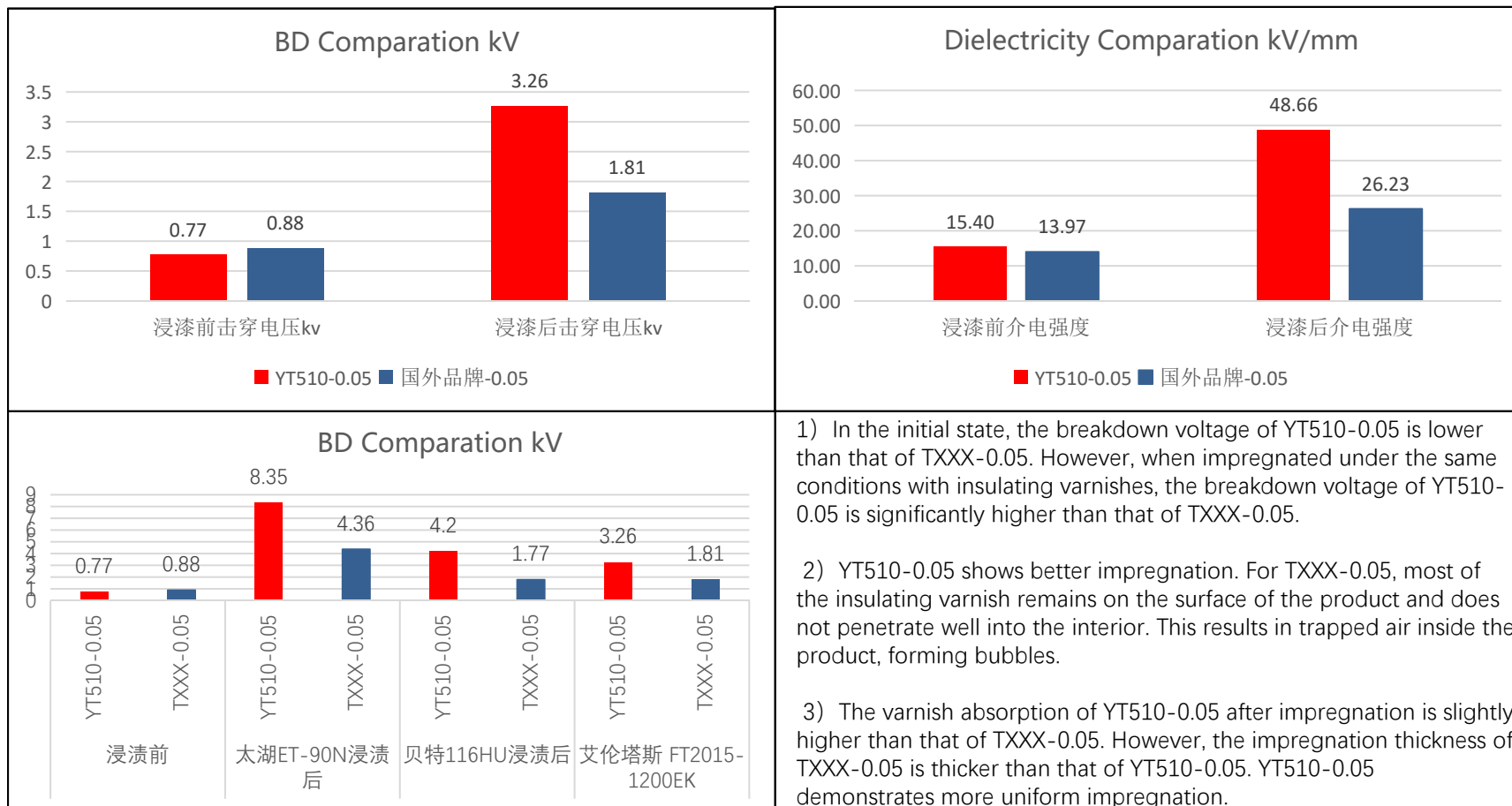


Remark: The insulating varnish is ELANTAS FT2015-1200EK

2.3 Superior EIS Performance

➤ Insulating varnish compatibility

Dielectric strength comparison for YT510-0.05 vs foreign products before and after Impregnation



注: The insulating varnish adopts ELANTAS FT2015-1200EK, Taihu ET-90, and Bet 116HU

2.3 Excellent Transformer Oil Compatibility

Mineral oil (25# transformer oil)

Partial discharge comparison vs foreign products (YT510-0.05)

Item	Unit	YT510-0.05	Foreign products
Dielectric strength	kv/mm	15.2	17
Partial discharge inception voltage	V	580	565

Partial discharge comparison vs foreign products in oil
(YT510-0.05)

Item		Unit	YT510-0.05	Foreign products
Dielectric strength (25# Transformer oil, normal)		kV/mm	64.5	61.6
partial discharge (25# Transformer oil, normal)	Partial discharge inception voltage	kV	3.38	3.08
	Partial discharge extinction voltage	kV	2.88	2.73

2.3 Excellent Transformer Oil Compatibility

Synthetic ester oil(Midel7131)

Samples	After immersed in Oil(2min)		After immersed in Oil(24h)		After immersed in Oil(48h)		After immersed in Oil(144h)	
	Intermediate	Average	Intermediate	Average	Intermediate	Average	Intermediate	Average
YT510	27.9	28.5	76	74.3	75.3	74	74.2	74.9
Similar foreign products	26.5	26.7	63.8	64.6	64.4	64.5	62.3	63
Performance Comparison	5.28% ↑	6.74% ↑	19.12% ↑	15.02% ↑	16.93% ↑	14.73% ↑	19.10% ↑	18.89% ↑

Dielectric strength after
vacuum immersion for 2 min

Dielectric strength after vacuum impregnation
for 24h, 48h, 144h

Data source: ABB electrical laboratory in Switzerland

2.3 Excellent Transformer Oil Compatibility

Transformer Oil Compatibility - Midel Oil

The YT510 product was treated in Midel 7131 oil at 155°C for 192 hours, **with no effect on Midel 7131.**

Item	Unit	Midel7131	Midel7131+Aramid paper
Appearance	—	Transparent, free of impurities and suspensions	Transparent, free of impurities and suspensions
Chroma number	—	< 3	< 3
Acid Value	mgKOH/g	0.896	0.685
Change in Acid Value	mgKOH/g	—	-0.211
Breakdown Voltage	kV	45	44
Interfacial Tension at 25°C	mN/m	19.7	21.6
Dielectric Loss Factor at 90°C, 50Hz	—	0.2554	0.1204

Note: Reference standard: ASTM D 3455 -2011

2.3 Excellent Transformer Oil Compatibility

Transformer oil compatibility ---- vegetable oil

After thermal aging in vegetable oil, the color of similar foreign product turns black.

- ✓ Under thermal aging, although turns yellow, with the increase of temperature, the color no longer changes;
- ✓ Similar foreign products turn black after aging for 4 weeks at 180°C.
- ✓ It is necessary to test the changes in electrical properties under 180°C conditions

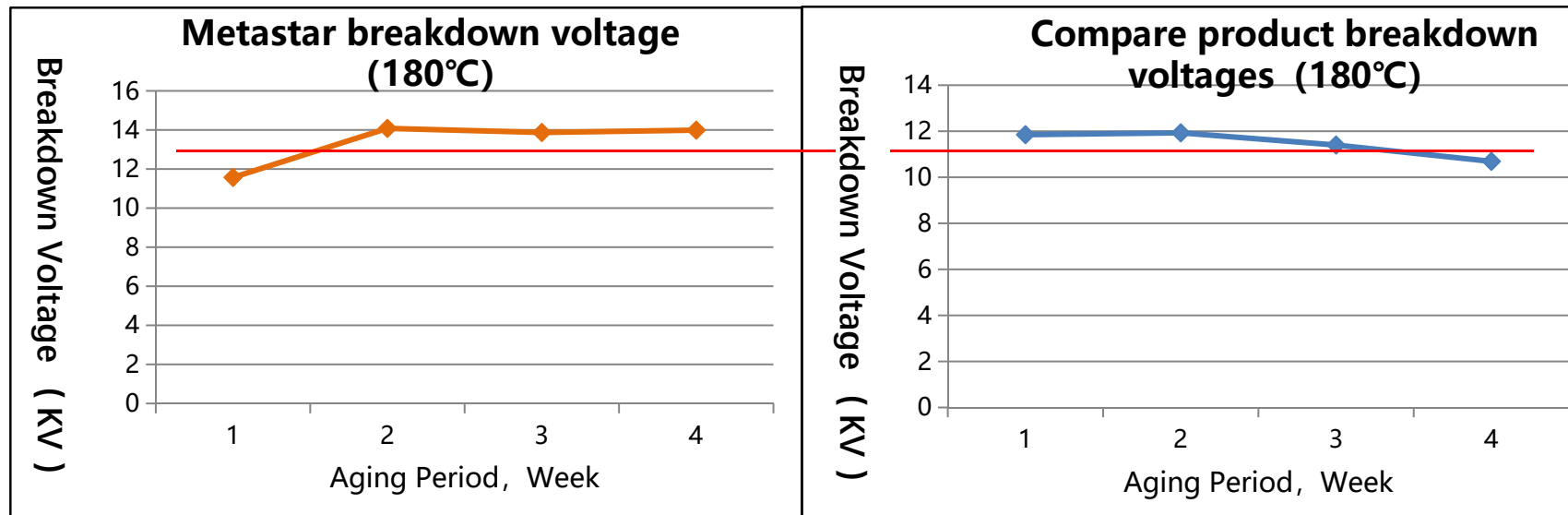
Specimen	original state	120°C Aging, 4weeks	120°C Aging, 4weeks
Metastar			 No Change
Other			 Become Dark

2.3 Excellent Transformer Oil Compatibility

Transformer oil compatibility ---- vegetable oil

Dielectric strength changes of YT510-0.18 and similar foreign product in vegetable oil, aging treatment at 180 °C for 28 days

- ✓ After aging at 180°C for 4 weeks, the breakdown voltage of Metastar aramid paper changes very little;
- ✓ After aging at 180°C for 4 weeks, the breakdown voltage of the comparison product decreased by **10%**.

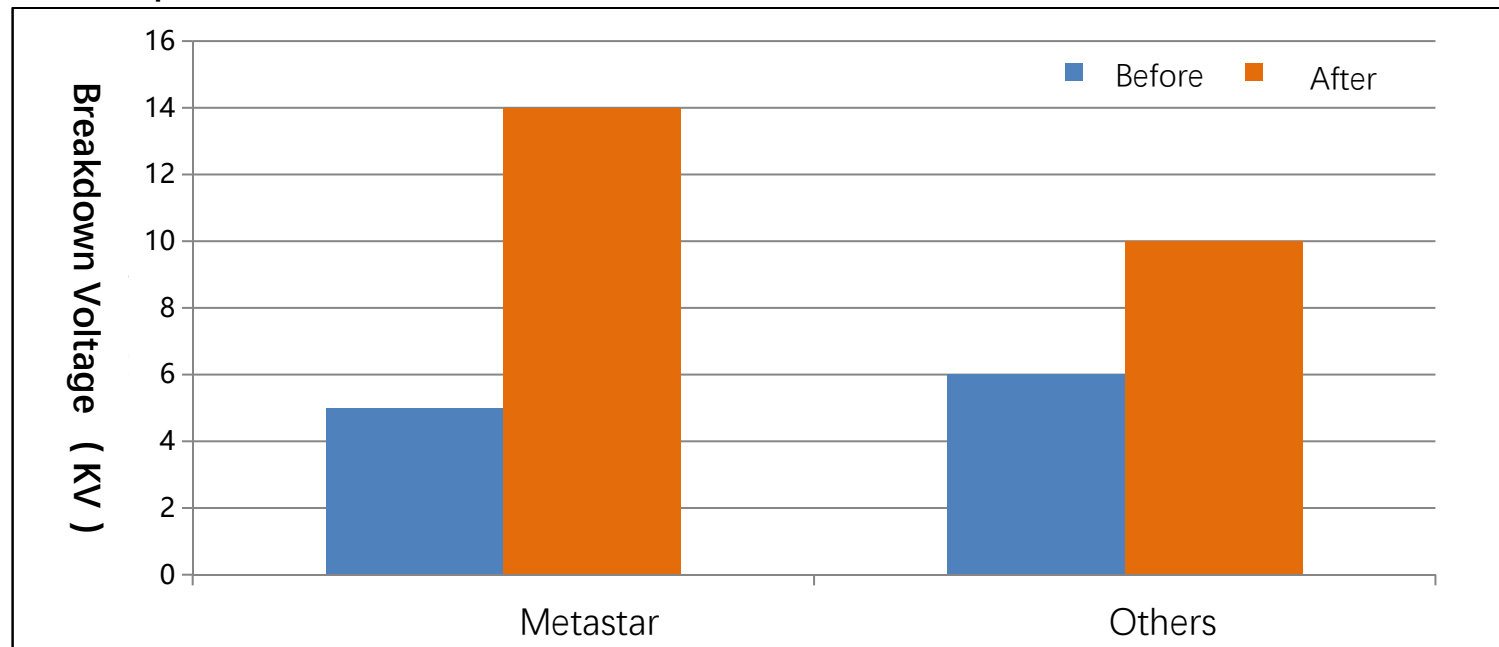


Note: Data provided by Korea Railway Research Institute

2.3 Excellent Transformer Oil Compatibility

Transformer oil compatibility---- Silicone oil

- I. In the air, breakdown voltage is 15% lower than that of the comparison product;
- II. Impregnated in silicone oil, aged at 180°C for 21 days
- III. The breakdown voltage has been increased by 180%, which is 40% higher than similar products.

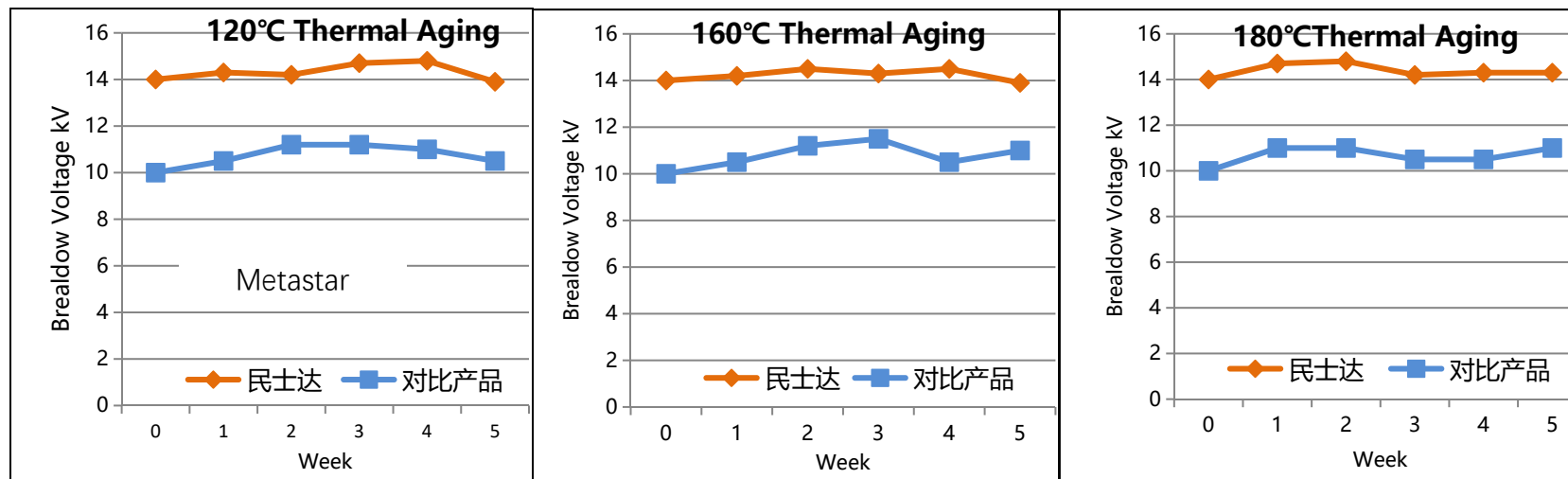


Note: Data provided by Korea Railway Research Institute

2.3 Excellent Transformer Oil Compatibility

Transformer oil compatibility---- Silicone oil

- ✓ Under the same heat aging cycle, treated with different temperatures, the breakdown voltage remains stable;
- ✓ With the change of temperature and thermal aging cycle, the breakdown voltage is always higher than that of the comparison product



Note: Data provided by Korea Railway Research Institute

2.3 Excellent Transformer Oil Compatibility

Transformer oil compatibility---- Silicone oil

Metastar aramid paper, pressboard and similar foreign products were placed in silicone oil and treated at 155 °C for 168 hours.

Item	Silicone oil	Aramid paper		Pressboard	
		Metastar	Foreign products	Metastar	Foreign products
Dielectric dissipation factor	2.14×10^{-4}	3.45×10^{-4}	5.01×10^{-4}	4.56×10^{-4}	6.75×10^{-4}
Acid (mgKOH/g)	2.1	2.8	6.5	4.2	7.7

2.4 Superior EIS Performance

➤ Compatibility of insulating varnishes

- Better wettability of insulating varnish, **can effectively improve the impregnation efficiency**
- Better ensure **the fullness of the impregnation, impregnation is more uniform.**
- **Good curing effect,** effective resistance to vibrations and impacts during the process
- The electrical insulation properties **are further improved**
- **Superior wetting saturation brings great benefits to the impregnation and casting process** of electric motors and transformers.
- Metastar Aramid paper has a good compatibility with various of insulating varnishes to **form a more advantageous EIS system.**

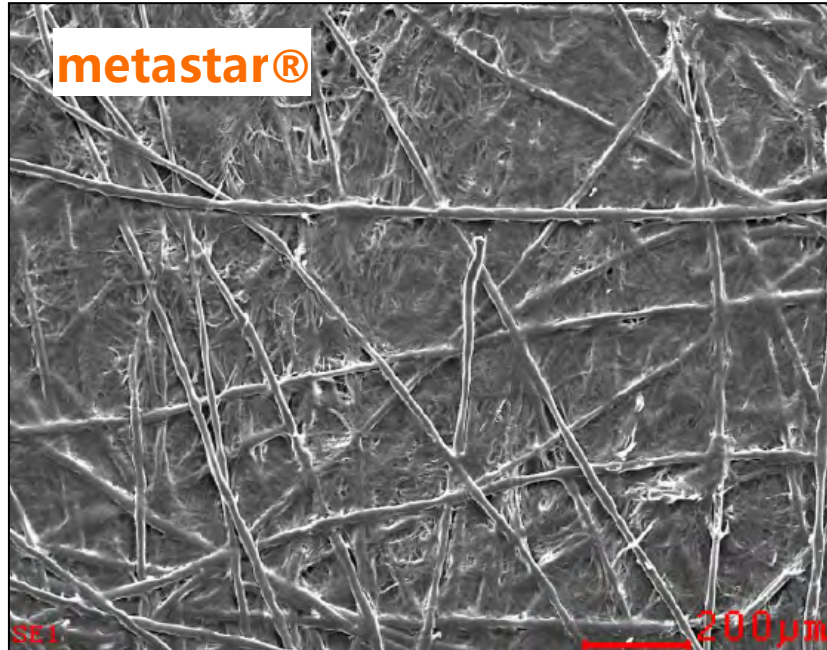


metastar®

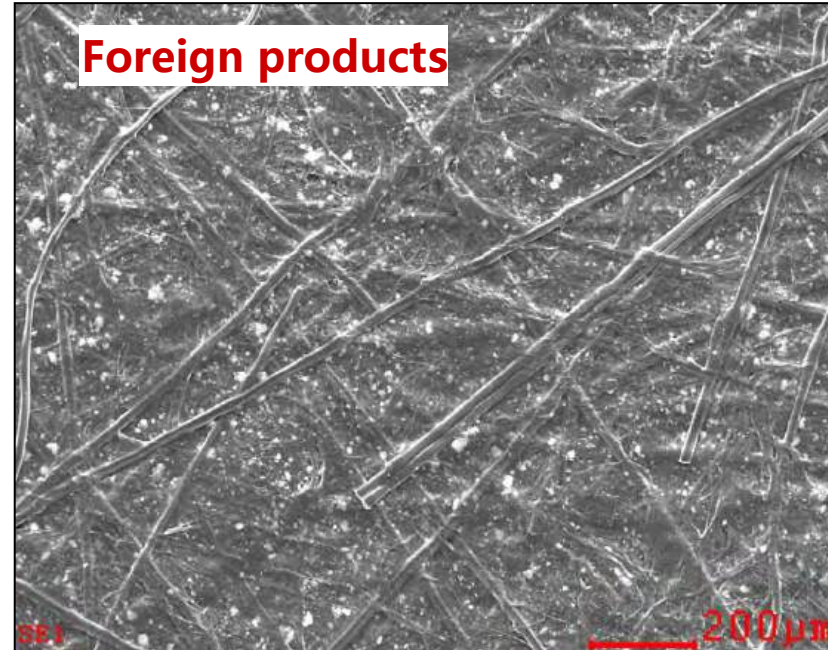


Foreign product

2.4 Superior EIS Performance



No Coating



Coating

Both aramid papers consist of chopped fiber and fibrils.

metastar® aramid paper has an unclosed surface and is better in terms of air permeability and paint absorption.

2.4 Superior EIS Performance

metastar®

Foreign products



Under the condition of 220°C for 30min, similar foreign aramid paper products will have the phenomenon of blistering and delamination.

metastar®

Full lifecycle quality management



GB/T29490

EN45545 for traction transformers

2.5 Quality Assurance



Paper making production line



Hot pressing production line

- Completely independent intellectual property rights of aramid paper industrial production technology and equipment
- Experimental analysis and physical property testing are well-equipped and highly accurate to achieve full parameter control of product production process



Liquid chromatography



Gas chromatography



MRI



Potentiometric titration



Simulation



Thickness gauge



Tear meter



Tensile tester

2.5 Quality Assurance

Digital Platform: It has an online monitoring system and Huawei Cloud digital platform.



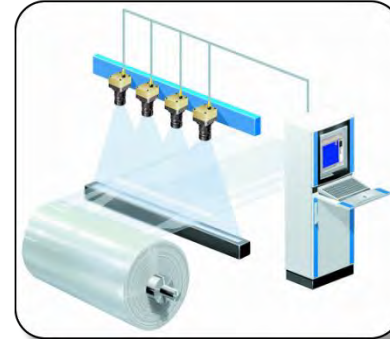
QCS Control system



Thickness monitoring



Metal monitoring



Defect monitoring

- On-line quantitative QCS control system to ensure product uniformity;
- On-line metal monitoring, no mixed metal substances, to ensure electrical insulation performance;
- On-line thickness monitoring system monitors the thickness of the product to ensure the consistency of the product thickness;
- Online defect monitoring, monitoring of product defects, rejection of unacceptable appearance defects.

2.5 Quality Assurance

□ Testing Platform

Testing Facilities: It has a complete set of raw material research laboratories and product testing instruments, and has built a drive motor application testing platform, integrating R&D, production, testing, and application, providing one-stop, professional, and systematic technical solutions.

➤ Product Test



Thickness
gauge



breakdown
voltage tester



high resistance
meter



universal testing
machine



universal
testing machine



surface
hardness tester

➤ Application Test (Materials、Structure)



high and low temperature
shock chamber



sealed tank



high-frequency pulse
electrical aging tester



automatic comprehensive
tester (resistance, partial
discharge)



Karl Fischer
tester



structural
aging oven

1

Oil Filled Transformer

Application:

Power Transformer,

Distributor transformer,

Reactor,

Traction Transformer,

Wind Energy Transformer,

Typical Customers:

Hitachi Energy, Siemens, SGM, CG-PPI

Hitachi Energy, Siemens, Toshiba, JST

Schaffner, Yunlu

Hitachi Energy, CRRC, Siemens

Hitachi Energy, Siemens, HP, GE

2.6 Product - Application

1

Oil Filled Transformer

Wrapping insulation	Aramid paper	YT510-0.05
----------------------------	--------------	------------

Shielding insulation	Pressboard	YT593-1\1.5
-----------------------------	------------	-------------

Strips	Pressboard	YT593-3
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Lead-out insulation	Crepe paper	YT511-0.13C
----------------------------	-------------	-------------

Lead-out insulation	Aramid tube	YT511-0.13T
----------------------------	-------------	-------------

Interlayer insulation	DDP paper	YT56-0.25D、 0.51D
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2.6 Product - Application

2

Dry type Transformer

Application:

Distributor transformer,

Reactor,

Transformer for welding machine

Microwave Transformer

Typical Customers:

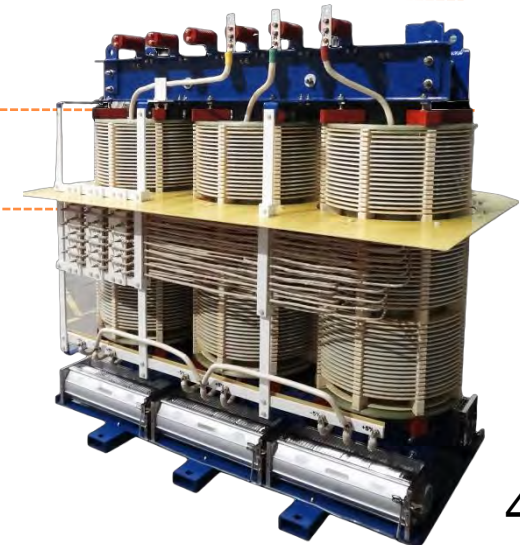
Hitachi Energy, Schaffner, JST,

Toshiba

Schaffner, Yunlu

Panasonic, OTC

Whirlpool



2.6 Product - Application

2

Dry type Transformer

Wrapped wire

YT510: 0.05

Wrapping interlayer insulation

YT510: 0.08/0.13/0.18/0.25 , YMY

Inter-turn insulation

YT510: 0.13/ 0.18/0.25/0.38,

Insulating cylinders

YMY: 0.9/1.4 YT510: 0.51、 0.38

Unit: millimeter (mm)

2.6 Product - Application

3

Motor and Generator

Application:

Motor, Generator,

Traction Motor,

High speed motor,

Wind generator,

EV Motor,

Customers:

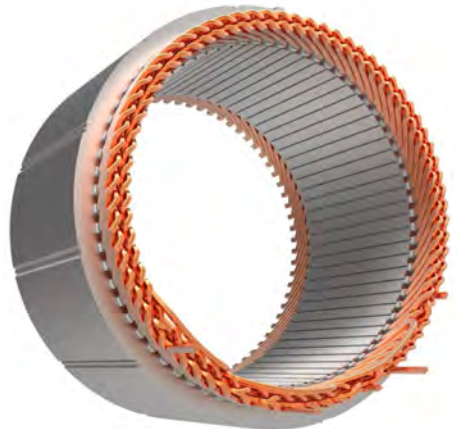
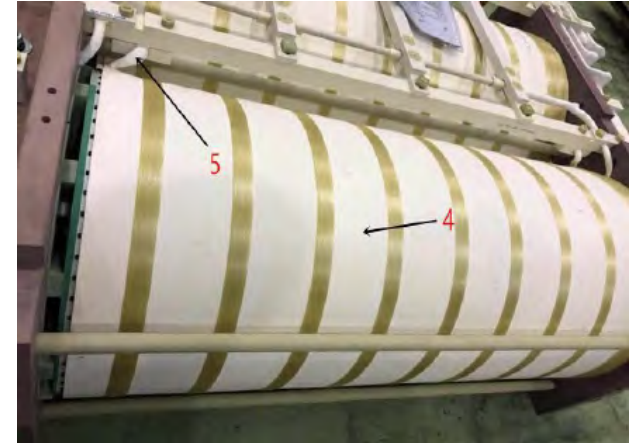
ABB, Siemens, WEG, HE

ABB, CRRC

Wolong

Vestas

Prestolite Motors, JJE Driving



3

Motor and Generator

Insulation Material: Aramid Paper + resin

Calendared paper: YT510 w

Flexible Laminates: YMY, YHY

Advantage: Hi stiffness & Hi BDV

Insulation Material: Mica Paper + resin

Mica paper: YT518, YT568 LAM

Insulation Material: Aramid Product + resin

Mica Tape: YT-CM-A005

Advantage: Corona resistance, Hi BDV, Heat conduction

Aramid Felt: YT7540

Advantage: Varnish Absorption, Hi-temp resistance

2.6 Product - Application

4

Electronic

Application:

Lithium Battery, (YT516)

Arc Extinguish Chamber in Breaker,
(YT510 W)

Label (IT device and Vehicle) (YT516)

Typical Customers:

Panasonic, SANYO, LG Chemical, Sony

Schneider, Changshu

2.6 Product - Application

4

Electronic

Application:

Lamination for wafer and hard disk

PCB

Crash Pad for PCB

Products:

Para-aramid Paper YT836 + Epoxy

Aramid paper YT852, with Dk 1.48, Df 0.0064

Uncalendared paper YT511 + aramid felt YT7540





03

PART THREE

Perpetual
Innovation
Momentum

3.1 Perpetual Innovation Momentum

■ 1+1+N

One Yantai headquarter+One Ningxia research center+ N Joint Laboratory , Cooperate with well-known universities and research institutes in the industry to converge cutting-edge technical talents and integrate innovative resource elements.

Ningxia
R&D



Lab with
Ningxia Univ.



Lab with
Lanzhou Ins.
of Chemical
Physics



Yantai Advanced
Materials Research
Institute



Lab with
Dalian Univ. of
Technology



Lab with
Tiangong Univ.



Lab with
Fudan Univ.

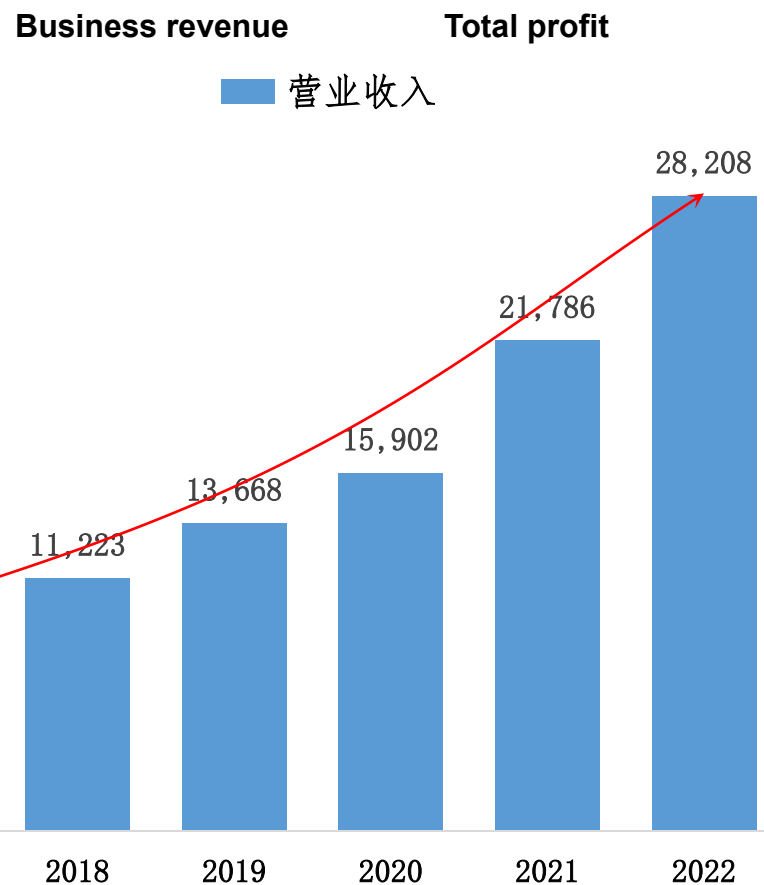


3.1 Perpetual Innovation Momentum

Adhere to the development strategy of "talent-led, innovation-driven"

Focusing on the three aspects :

- Existing business improvement,
- Incremental business expansion
- Industrial chain extension
- R & D expenses were 27.0198 million yuan. The proportion of R & D investment in operating income increased to 6.62%.



3.1 Perpetual Innovation Momentum

- National manufacturing single champion demonstration enterprise
- National-level specialized and special unique enterprise
- National Aramid Engineering Technology Research Center
- National Science and Technology Progress Award :1 item
- National and Industry Standards: 21 items
- Provincial and Ministerial Awards: 8 items
- Province Quality Benchmark Enterprise
- Yantai Mayor Quality Award
- Authorized Patents: 31 items





04

PART FOUR

Customer-Focused Service Ecosystem



metastar®



4.1 Customer-Focused Service Ecosystem

Hitachi Energy

- Started in 2010, globally qualified supplier;
- Traction transformers, Dry-type transformers, wind power transformers, ultra-high voltage transformers, etc



SIEMENS

- Started in 2014, globally qualified supplier;
- Wind power transformers, ultra-high voltage transformers, traction transformers, etc



4.1 Customer-Focused Service Ecosystem

Hitachi Energy Shanghai

Dry-type transformers

Low-voltage transformers

➤ – 750 kVA

➤ – 400/400 V

➤ – Dzn0

Type: YT510-0.05/0.13/0.18mm

Hitachi Energy Power Grids –Germany

Rail system

Type: YT510-0.76mm

Vestas –Hitachi Energy finland

Wind power transformers

➤ Type:YT510-0.25mmDDP

产品使用评价证明

我公司作为变压器制造商主要提供干式变压器,支持全生命周期服务及相关零、组件。我公司自 2012 年 7 月至今使用烟台民士达特种纸业股份有限公司生产的型号为 YT510、YT564 芳纶纸产品用于干式变压器线圈绕组,相间、匝间的绝缘材料,绝缘等级达到 H 级,绝缘性能达国际领先水平,主要应用于海上风电,大数据中心等。我司主要客户有歌美飒、远景、京东方等公司。在保证高可靠性的同时,降低生命周期维护成本,既持久保证优异性能,又降低对环境的影响。

特此证明



4.1 Customer-Focused Service Ecosystem

Schneider

- Started in 2017, globally qualified supplier;
- Used for gasket insulation of low and medium voltage switches and circuit breakers



SGB

- ✓ **epoxy cast transformer**
- ✓ Type
 - YT510 0.05mm
 - YT511 0.58mm



4.1 Customer-Focused Service Ecosystem

➤ GE Tower Transformers

✓ Type

YT510-0.13D (interlayer insulation)

YT510-0.18/0.51/0.76 End insulation/internal insulation

➤ JST

➤ Wrapping insulation

Aramid paper

YT510-0.05



4.2 Product - Application Cases

UHV power transformers

➤ **Hitachi Energy、SIEMENS、HYOSUNG**

±400kV UHVDC converter transformer

±800kV UHVDC converter transformer

1100kV UHVDC converter transformer



- | | | |
|--------------------------------|------------------|------------------------|
| ➤ Shielding insulation | Pressboard | YT593-1、 1.5、 3 |
| ➤ Strips | Pressboard | YT594-4、 6 |
| ➤ Lead-out insulation | Crepe paper/tube | YT511-0.13T |
| ➤ Interlayer insulation | DDP paper | YT56-0.25D |
| ➤ Interlayer insulation | Aramid paper | YT510-0.30、 0.51、 0.76 |

4.2 Product - Application Cases

Variable Frequency transformer

Stable operation in harsh environments such as Mount Everest at **5350m** above sea level and at Marine environment

- **Copper wire wrap insulation** Aramid paper YT510-0.05



4.2 Product - Application Cases

Wind power generators, transformers

✓ Generators

- Aramid paper laminates
- Mica aramid paper laminates

✓ Wind power transformers

- ✓ Slot insulation, interlayer insulation, phase insulation, wire wrapping, sleeve, and end insulation ;
 - Aramid pressboard
 - Aramid paper
 - Aramid DDP
 - Aramid crepe paper
 - Aramid crepe paper tubes



Wind power generators



Wind power transformers

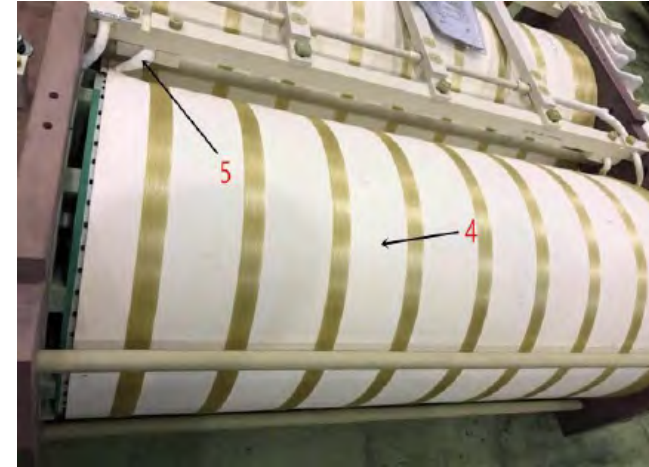
4.2 Product - Application Cases

Traction transformers

➤ **Hitachi Energy, SIEMENS, CRRC**

Trains	Speed 160、 200km/h
High-speed rail	Speed 250、 350km/h
Smart high-speed rail	Speed 400km/h

- **Wrapping insulation** Aramid paper YT510-0.05
- **Interlayer insulation** Aramid paper YT510-0.18
- **Strips** Paper+Pressboard YT510+YT594
- **End insulation** Aramid paper YT510-0.51
- **insulated cylinder** Pressboard YT593-1.5
- **Lead-out insulation** Crepe paper YT510-0.08C



4.2 Product - Application Cases

Traction Motor

CRRC For subway and high-speed train traction motors

Copper wire winding insulation Aramid mica tape YT-CM-A005-0.12

Features: Contains 5% aramid fibers, reduces adhesive usage, facilitates better resin absorption, and reduces "fly ash" phenomenon.

Case: Traction Motor: In 2018, YT-CM-A005-0.12 passed the CRRC installation review and was applied in batches.

Item		YT-CM-A005-0.12	CRRC Standard
Unit area weight	g/m ²	166.2	162±14
Thickness	mm	0.122	0.12±0.02
Width	mm	25	25±2
Mica paper weight	g/m ²	124.1	120±11
Glass fabric weight	g/m ²	23.1	24±2
Adhesive content per unit area	g/m ²	18.98	18±4
Tensile strength	N/cm	93	>80
Breakdown voltage	kV	2.65	>2.5
Air permeability	s/100mL	3589	<4000



4.2 Product - Application Cases

Reactor

Voltage level: 6kV、10kV、 20kV、 35kV

Interlayer insulation Aramid paper YT516-0.13

End insulation Aramid paper YT510-0.51

Application parts: Interlayer、 End、 Wrapping insulation

YT510-0.13、 YT511-0.38、 YT56-0.3



4.2 Product - Application Cases

Electric Vehicle Oil-cooling Flat Wire Driving Motor Applications

EV/HEV

- Drive motor, inspiration motor, electronic control, Chip encapsulation (RFID);
- Slot insulation, slot wedge, interlayer insulation, phase insulation, etc ;



YT510-0.22W
AHA-0.21



Oil-cooling flat wire
drive motors



Multiple 800v highvoltage
platform models



Two years' of operation



No abnormalities

Widely used in oil-cooling flat-wire motors, and has been widely used in the 800V oil-cooling motors of several models.

High-performance quality for better security



Thanks Metastar

To be a global leader in
high-performance functional
paper-based materials

Comprehensive Strategic Collaboration Partner in India
Resistance Alloys Impex LLP
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Mob: 98209 62560 (Rohan M. Mehta - Partner)
Tel: 022-6610 7940, 3560 0124
Email: rail@railnem.com