

Air++

Applications of Series Function Materials in Rail Transportation

Technology · Innovation

Brand · Development

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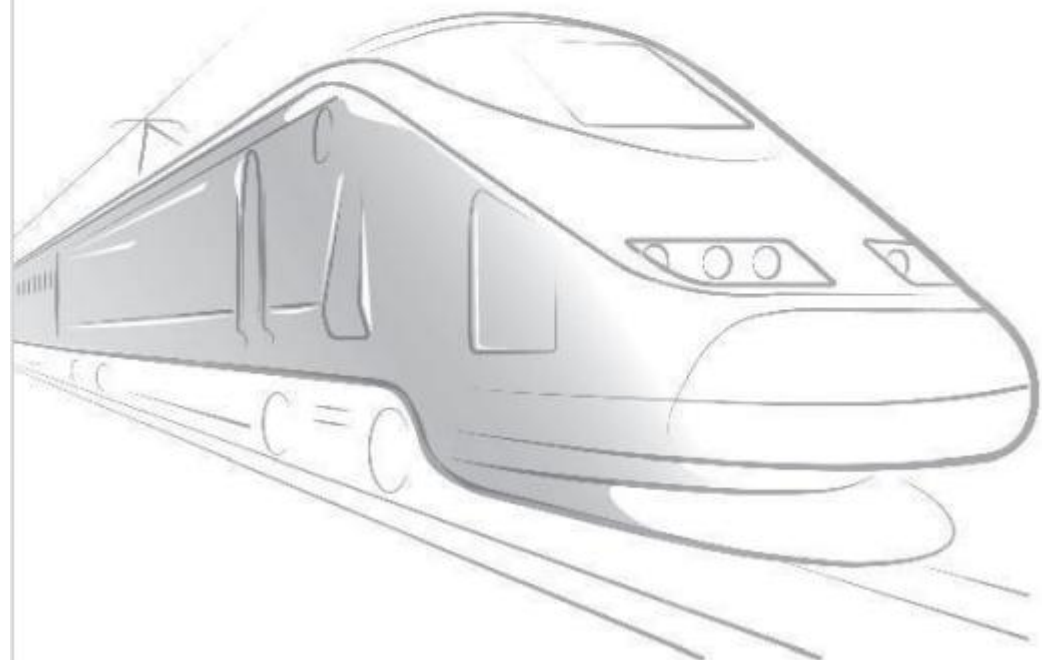
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Qingdao Air++ New Materials Co., Ltd.

Air++

Safety First



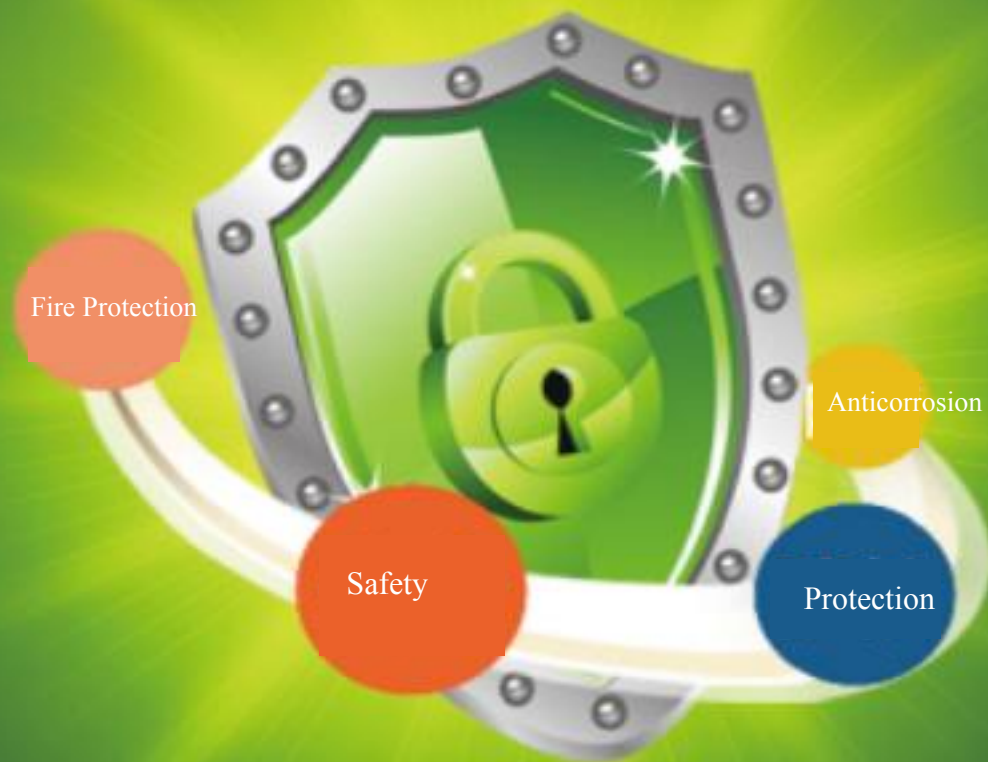
Company Introduction

Qingdao Air++ New Materials Co., Ltd. (abbreviated as Air++), established in 2006, is a national high-tech enterprise and a specialized and sophisticated "little giant" enterprise that focuses on the research and manufacturing of new materials for safety protection such as polyurea elastomers and special functional materials. It is also recognized as a Gazelle enterprise in Shandong Province.

The company has established technical platforms such as Qingdao Polyurea Elastomer Key Laboratory, Qingdao Smart Coating Scenario Application Laboratory, Qingdao Certified Enterprise Technology Center, and Qingdao Technology Innovation Center. The company's independently developed high-performance polyurea elastomer technology has filled the domestic gap, and its special functional materials have successively broken foreign technology monopolies. The company holds 63 national patents, including 47 invention patents; it has participated in the formulation of 27 national and industry standards, and has undertaken key special projects under the National Key Research and Development Program.

Air++ is dedicated to becoming a leader in new materials for safety protection. "Air++" is a well-known brand in the industry. Through continuous and deep development, the company has developed internationally competitive technologies for new safety protection materials in the fields of anti-explosion, fire protection, anticorrosion, waterproofing, vibration and noise reduction, and so on. Its products play a significant role in the safety protection of advanced manufacturing industries and large-scale infrastructure projects, including defense and military, water conservancy and electric power, rail transit, petrochemical, and new energy.





Contents

01 [Enterprise Profile]

Company Introduction -----01-02

Product Catalogue-----03-04

Company Culture -----05-06

Honor and Qualification -----07-08

02 [Product Profile]

Lightweight Water-based Damping Coating (Air++3100G) -----09-10

Water-based Damping Coating (Air++3101D) -----11-12

Low Temperature and High-performance Water-based Damping Coating(Air++3101C)-----13

Water-based anticorrosion Damping Coating(Air++3101M)-----14

Multifunction Water-based Damping Coating(Air++3101M)-----15-16

Application of Water-based Damping Coating in Urban Rail Vehicles-17-18

Water-based Sound Insulation Protection Coating(Air++3119) -----19

Composite Environmentally Friendly Damping Film(Air++3105)-----20

Arc resistance Breakdown Coating System(Air++SH-11)-----21-22

Arc Resistance Insulation Coating(Air++SH-5)-----23-24

Application of Arc resistance Breakdown Coating -----25-26

Water-based Fire-retardant Coating(Air++3601)-----27-28

Fire-retardant Paint Applied to the Beijing Winter Olympics Branch Project -----29-30

Water-based Antifogging Coating(Air++3508)-----31-32

Water-based Non-slip Coating(Air++NS201)-----33-34

03 [Case Profile]

Partial Achievements -----43-44



Corporate Mission

Leveraging technology to create value for customers
Empowering employees to achieve happiness through
their careers

Corporate Vision

A Leader in New Materials for Safety Protection

Corporate Values

Customer First

Air New Materials——not only a platform for pursuing dreams
But also a home for growth
Advancing and growing together!

Enterprise Honor



In August 2008, the company was awarded the Certificate of Recommended Product for Safety and Environmental Protection Coatings.

In August 2008, it obtained ISO9001 Quality Management System certification.

In January 2013, it was honored as one of the Top Ten Innovative Enterprises in Qingdao.

In December 2013, it passed the identification of national high-tech enterprise

In August 2015, it was awarded as a Qingdao high-tech "Thousand Sail Plan Enterprise"

In January 2016, it was rated as a famous trademark in Shandong Province

In March 2016, it was rated as a Qingdao famous trademark

In June 2016, it was recognized as an excellent member of PDA Polyurea Development Association

In September 2016, it became the Council Member Unit of China Industry Anticorrosion Technology Association

In October 2016, it awarded as AAA Credit Rating Enterprise

In November 2016, it was successfully listed on the National Equities Exchange and Quotations (NEEQ)

In December 2016, it was rated as a famous brand in Shandong Province

In December 2016, it passed the certification of Qingdao Enterprise Technology Center

In December 2016, it was awarded as the hidden champion of the industry

In June 2017, it was rated as the demonstration unit for the development of new economy in small and medium-sized enterprises in Shandong Province

In October 2017, it obtained environmental management system certification

In December 2017, it was rated as a Qingdao famous brand

In October 2018, it won the third prize in the national finals of China Maker Innovation & Entrepreneurship Contest

In November 2019, it was rated as the 2018-2019 advanced unit of coatings standardization

In December 2019, it won the first prize of Science and Technology Progress Award in Building Waterproofing Industry

In December 2019, it was recognized as Qingdao Enterprise Innovation Center

In November 2020, it was awarded as a national specialized and sophisticated "little giant" enterprise

In November 2020, it won the third prize of Qingdao Science and Technology Invention Award

In December 2020, it was awarded as a gazelle enterprise in Shandong Province

In December 2020, it won the third prize of “2020 New and Old Kinetic Energy Conversion High Value Patent Cultivation Competition”

In November 2021, the “Air++ Ultra-thin Intumescent Fire Retardant Coating Project” won the third prize in the finals of the National Innovation Center of High Speed Train competition

In February 2022, it undertook the sub-tasks of key special technological research and development as well as demonstration production of the “National Key Research and Development Program” launched in 2011

In June 2022, the “Qingdao Smart Coating Scenario Application Laboratory”was successfully selected into the second batch of scenario application laboratories in Qingdao

In November 2022, the Qingdao Polyurea Elastomer Key Laboratory built by Qingdao Air++ New Materials Co., Ltd. was successfully approved

In November 2023, it was awarded as the 2023 national intellectual property advantage enterprise

In October 2024, it was assessed as the 2024 key "little giant" enterprise.

Lightweight Water-based Damping Coating(Air++3100G)

Product Overview

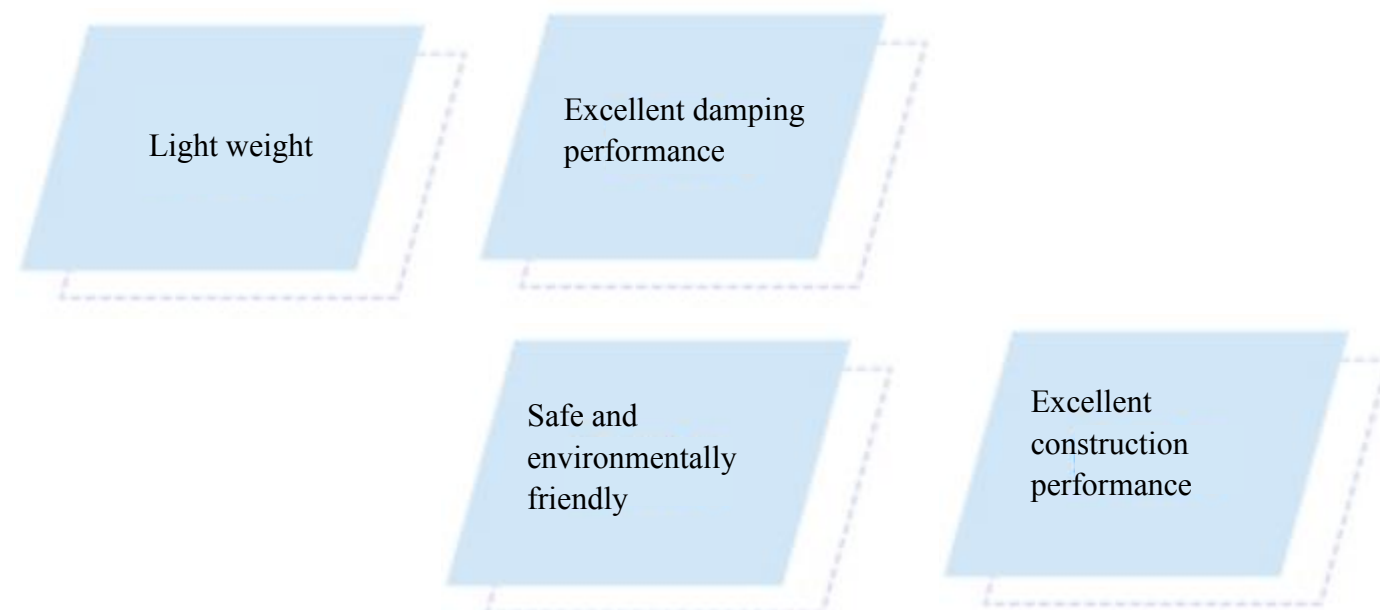
- The lightweight water-based damping coating is fully independently developed, which not only improves the performance compared to conventional damping products, but also has a density that is more than 20% lower than conventional damping paints. This product is designed for lightweight rail transit vehicles and the research and development of next-generation high-speed rail vehicles.

Performance Index

Category	Item	Technical index		Test method
Coating performance	Consistency	8~14cm		GB/T1749
	Non-volatile matter content	≥65%		GB/T1725
	Actual drying time	≤48h		GB/T 1728-1979
	Construction performance	It can be scraped or high-pressure sprayed coating, with a wet film of 4mm and no sagging.		GB/T9761
Coating film performance	X-Cutting test	≤Grade 1		ISO 16276-2:2007
	Flexibility	≤100mm		GB/T1748
	Resistant to liquids medium[NaCl, 3%(mass fraction, 15d]	No serious softening, no swelling, no bubbling, no peeling		GB/T9274-1988
	Thermal resistance[(120 ± 2)° C, 4h]	No sagging, no bubbling, no wrinkling, no cracking		GB/T1735
	Resistance high-low temperature cycles alternating test (60 cycles)	No bubbling, no cracking, no dropping, X-cutting test ≤Grade 1. The adhesion of the blade during prying is not significantly reduced		Q/CR 546.3-2016
	Low temperature impact resistance[(-40 ± 2)° C, 4h]	No stratification, no rupture		Use a φ 40mm(mass 260g) steel ball to freely drop from a height of 1m for impact.
	Salt mist resistance(600h)	The board does not bubble, crack and rust; the coating film has no swelling or serious softening; the spread of film damage or rust in the scratch area does not exceed 2mm (unidirection).		GB/T1771
	Stone cracking resistance test	No exposed the bottom, no cracking		Q/CR 546.6-2016
	Coating film density	≤1.2g/cm ²		Q/CR 581
Functionality	Composite loss factor ηc	+50° C	≥0.035	GB/T 18258-2000
		+40° C	Measured value	
		+30° C	Measured value	
		+20° C	≥0.110	
		+10° C	Measured value	
		0° C	Measured value	
		-10° C	≥0.035	
Environmental protection and fire protection	Prohibited and restricted substances	Meet the requirements		TB/T 3139
	Requirements for fire protection of materials	Grade HL3		EN45545-2

*The stone impact resistance test is only applicable to parts with anti-stone impact requirements, such as the outer surface of the frame.

Product Advantages



Typical Applications



Water-based Damping Coating（Air++3101D）

Product Overview

Air++ 3101D Water-based Damping Coating is a high-performance water-based damping paint developed for high-speed running trains. It is mainly used for the reduction of vibration and noise and protection stone impact resistance on the inner surfaces of the body and the outer surfaces of the underframe of bullet trains and urban rail vehicles.

Performance Index

Category	Item	Technical index		Test method
Coating performance	Consistency	8~14cm		GB/T1749
	Non-volatile matter content	≥65%		GB/T1725
	Actual drying time	≤48h		GB/T 1728-1979
	Construction performance	It can be scraped or high-pressure sprayed coating, with a wet film of 4mm and no sagging.		GB/T9761
Coating film performance	X-Cutting test	≤Grade 1		ISO 16276-2:2007
	Flexibility	≤100mm		GB/T1748
	Resistant to liquids medium[NaCl, 3%(mass fraction, 15d]	No serious softening, no swelling, no bubbling, no peeling		GB/T9274-1988
	Thermal resistance[(120±2)° C, 4h]	No sagging, no bubbling, no wrinkling, no cracking		GB/T1735
	Resistance high-low temperature cycles alternating test (60 cycles)	No bubbling, no cracking, no dropping, X-cutting test ≤Grade 1. The adhesion of the blade during prying is not significantly reduced		Q/CR 546.3-2016
	Low temperature impact resistance[(-40±2)° C, 4h]	No stratification, no rupture		Use a φ 40mm(mass 260g) steel ball to freely drop from a height of 1m for impact.
	Salt mist resistance(600h)	The board does not bubble, crack and rust; the coating film has no swelling or serious softening; the spread of film damage or rust in the scratch area does not exceed 2mm (unidirection).		GB/T1771
	Stone cracking resistance test	No exposed the bottom, no cracking		Q/CR 546.6-2016
Functionality	Composite loss factor ηc	+50° C	≥0.035	GB/T 18258-2000
		+40° C	Measured value	
		+30° C	Measured value	
		+20° C	≥0.110	
		+10° C	Measured value	
		0° C	Measured value	
		-10° C	≥0.035	
Environmental protection and fire protection	Prohibited and restricted substances	Meet the requirements		TB/T 3139
	Requirements for fire protection of materials	Grade HL3		EN45545-2

Product Advantages

Strong adhesive force

In environments with complex climate conditions, high-speed motion, and high-intensity vibrations, metal substrates can maintain extremely strong adhesive force for a long time, such as coatings and carbon steel, aluminum alloys, etc.

Excellent resistance high-low temperature cycles alternating performance

60 cycles without bubbling, cracking, or dropping

High construction efficiency

It can be applied with a thick coating, and can reach up to 4mm without sagging in one spray.

Typical Applications



Air++3101D is applied to the underframe of the train

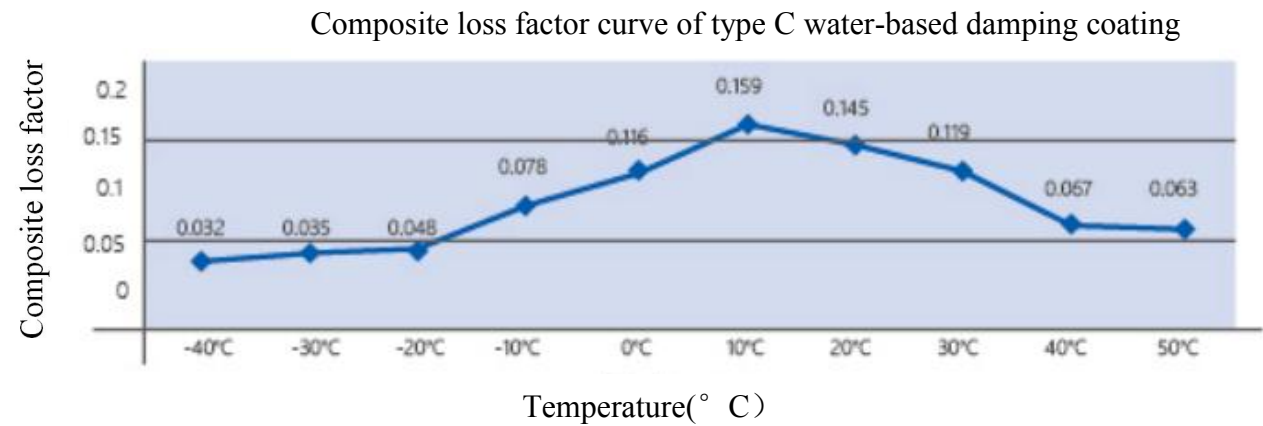
*The stone impact resistance test is only applicable to parts with anti-stone impact requirements, such as the outer surface of the frame.

Low Temperature and High-performance Water-based Damping Coating

Product Overview

- Air++ 3101C Low-Temperature High-Performance Water-Based Damping Coating has excellent low-temperature resistance performance, and the product has obvious advantages in technical parameters, construction performance, etc. compared with similar products from foreign countries. Air++ is one of the few companies in the world that currently have high-tech low-temperature water-based damping paint.
- Air++ 3101C has high adhesive force, low-temperature, high viscosity and other advantages, and it can maintain good damping performance for a long time in the temperature range of -40° C to +40° C. It can adapt to harsh operating environments such as sandstorms, rain and snow, and high altitude. This product is fully capable of providing excellent damping and shock absorption effects for locomotives operating in high and cold regions.

Performance Index



Product Advantages

High adhesive force

Coating and substrate can maintain a strong adhesive force for a long time.

Low-temperature area

It can maintain good damping performance for a long time in the ambient temperature range of -40° C to +40° C.

Stone impact resistance

The coating has the characteristics of viscoelasticity and high adhesive force, and can fully withstand the impact of sand and gravel particles during high-speed train operation.

Excellent constructability

There is no sagging of 4-5mm during one construction.

Environmental protection

Water-based, no harmful substances volatilization.

Water-based Anticorrosion Damping Coating(Air++3101M)

Product Overview

Air++3101M Water-based Anticorrosion Damping Coating has excellent vibration and noise reduction performance and anticorrosion performance, and is widely used in the chassis of 25 series passenger cars. This product is widely used in CRRC Group.

Performance Index

Category	Item		Technical index		Test method
Coating performance	Appearance and color of coating		No crust and hard lumps that cannot be stirred		GB/T9761
	Consistency		8~14cm		GB/T1749
	Non-volatile matter content		≥65%		GB/T1725
	Drying time(Actual drying)		≤36h		GB/T 1728
Coating performance film	Appearance and color of film		It meets the color requirements, the surface is basically flat, without sagging or cracking.		GB/T 9761
	Flexibility		≤100mm		GB/T1748
	Coating film density		≤1.4g/cm²		Q/CR581
	X-Cutting test		≤Grade 2		ISO16276-2:2007
	Resistant to liquids medium(30d)	NaCl, 3%(mass percent)	No bubbling, no swelling, no peeling, and allow mild softening		GB/T 9274
	Resistant to liquids medium(24h)	H2SO4, 10%(mass percent)	No bubbing, no sticky, and allow mild softening		GB/T 9274
		NaOH, 10%(mass percent)	No bubbling, no sticky, and allow mild softening		
	Thermal resistance		No sagging, no bubbling, no wrinkling, no cracking		GB/T 1735
	Low temperature impact resistance[(-40±2)° C, 4h]		No stratification, no cracking		Use a φ 40mm steel ball to freely drop from a height of 1m for impact.
	45° Angle combustion test		≥Flame retardant grades		TB/T 3138
Functionality	Composite loss factor		-10° C	≥0.03	GB 18258
			0° C	Measured value	
			10° C	Measured value	
			20° C	≥0.09	
			30° C	Measured value	
			40° C	Measured value	
			50° C	≥0.03	
Environmental protection and fire protection	Prohibited and restricted substances		Meet the requirements		TB/T 3139

Multifunction Water-based Damping Coating (Air++3101)

Product Overview

- Air++ 3101 Multi-Functional Water-based Damping Coating is a universal high-performance damping coating with the feature of being able to be applied by scraping and achieving the required thickness in one application without the need for specialized construction equipment. The drying time can be adjusted by adjusting the formula design to meet the requirements of customers, and the color can be adjusted to any desired shade. It is widely used in a variety of fields, including rail transit, engineering machinery, ships and vessels, and construction venues.

Performance Index

Category	Item	Technical index		Test method
Coating performance	Coating color	It can be customized according to requirements.		
	Drying time(Actual drying)	≤48h		GB/T1728
	Consistency	8~14cm		GB/T1749
Coating film performance	Flexibility	≤100mm		GB/T 1748
	Impact resistance(50cm)	No cracking, no wrinkling, no peeling, no shedding		GB/T 1732
	Cross-cut test(Distance of 5mm)	≤Grade 2		GB/T 9286
	Resistant to salt solution[(NaCl, 3%(wt), 15d]	No bubbling, no peeling, and allow mild softening		GB/T 1763
	Engine oil resistance	No bubbling, no peeling, and allow mild softening		GB/T 9274
	Resistant to cold and hot alternation test(5 cycles)	No bubbling, no cracking, no shedding		TB/T 2932
	Salt mist resistance(500h)	The board does not bubble, crack and rust; the coating film has no swelling or serious softening; the spread of film damage or rust in the scratch area does not exceed 2mm (unidirection).		GB/T 1771
	Thermal resistance[(100±2)° C, 4h]	No sagging, no bubbling, no wrinkling, no cracking		GB/T 1735
Functionality	Composite loss factor	-10° C	≥0.05	GB/T 16406
		20° C	≥0.11	
		50° C	≥0.05	
Environmental protection and fire protection	45° Angle combustion test	≥Flame retardant grades		TB/T 2402
	Limit of harmful substances	Meet the requirements		TB/T 3139

Product Advantages

Strong adhesive force

Coating and substrate can maintain a strong adhesive force for a long time.

Excellent damping performance

It has excellent damping characteristics over a wide temperature range.

Excellent constructability

It can be scraped or sprayed without air, and wet film 3mm does not sagging.

Typical Applications



Vibration reduction and noise reduction for intelligent automotive stamping line



Vibration and noise reduction of construction machinery

Application of Water-based Damping Coating in Urban Rail Vehicles

Water-based Sound Insulation Protection Coating （Air++3119）

Product Overview

- Air++3119 Water-based Sound Insulation Protection Coating works by evenly coating polymer resin around microparticles with sound insulation effect, reducing the energy of transmitted sound waves and thus serving as a sound absorption and insulation. The product construction is convenient and efficient, and can be sprayed, brushed, rolled, and scraped coating. It is suitable for sound insulation and noise reduction protection of interior panels, snow baffles, sound insulation covers, and other parts of rail transit vehicles.

Performance Index

Category	Item		Technical index	Test method
Coating performance	Coating appearance		There is no crust or layer in the container, and no hard lump after mixing.	GB/T1728
	Actual drying		≤24h, Method C	GB/T1749
Coating film performance	Cross-cut test		≤Grade 1	GB/T 9286
	Impact resistance performance		≥50cm	GB/T 1732
	Flexibility		≤50cm	GB/T 1732
	Low temperature impact resistance		-50° C ± 2° C/4h, No cracking, shedding, bubbling, discoloration, powdering	HG/T 5058 5.4.11
	Resistant to cold and hot alternation test(5 cycles)		There are 5 cycles and no exceptions.	HG/T 5058 5.4.13
	Resistant to liquids medium(10% acid-base)		There are no cracks, bubbles, bulges, or peeling phenomena.	GB/T 9274
Functionality	Sound insulation		Weight sound insulation increase index ≥24dB	GB/T 19889.3
	Composite loss factor ηc	-10° C	≥0.030	GB/T 16406
		20° C	≥0.090	
		50° C	≥0.030	
Environmental protection and fire protection	Volatile organic compounds contents(g/L)		≤100g/L, formaldehyde 0.1g/kg	GB 18582

Product Advantages

Excellent performance
It has excellent anticorrosion, vibration and noise reduction performance and sound insulation performance.

Safe and environmentally friendly
It uses water as the dispersing medium. VOC free, safe and environmentally friendly.

Good flexibility and strength
The paint film has good flexibility and strength.

Good adhesion
It has good adhesion to various metal and non-metal substrates.

Typical Applications



Sound insulation application of interior components

Composite Environmentally Friendly Damping Film(Air++3105)

Product Overview

- Air++ 3105 Composite Environmental Protection Damping Film is made of special polymer materials, with environmental protection flame retardants, damping fillers, and other raw materials. It adopts the latest patented technology and produces environmentally friendly solvent-free sheet materials through a special process flow. The finished product has stuck aluminum foil on the front and release paper on the back. Tear off the release paper during construction to stick it together.

Performance Index

Category	Item	Technical index		Test method
Physical and chemical performance	Peel strength	≥5(N-mm)/mm		GB/T1457-2005
	Low temperature impact resistance (-40° C,4h)	No stripping or abnormality		Q/CR581-2017
	Thermal resistance(110°C, 4h)	No stripping or abnormality		GB/T1735-2005
	Thermal resistance performance (5 cycles)	No stripping or abnormality		90℃ , 4h; Cool down to -40 °C within 0.5 hours-40℃ , 2h ; Heat up to 90 °C within 0.5 hours, which is one cycle.
	Salt mist resistance(NSS, 720h) Salt resistance	No shedding, no corrosion		GB/T10125-2021
Functionality	Composite loss factor	-10° C	0.06	GB/T 16406
		20° C	0.28	
		50° C	0.16	
Environmental protection and fire protection	Material fire protection	Grade HL3		Q/CR 699-2019
	Prohibited and restricted substances	Meet the requirements		TB/T 3139

Product Advantages

High adhesive force
It can be firmly stuck on the surface of metal, plastic, wood products and other substrates for a long time.

Damping performance
The loss factor of the composite damping film is larger than that of the damping film, and the effect of shock absorption and noise reduction is better.

Flame retardation performance
Compared with similar products at home and abroad, it has better flame retardant performance.

Environmental protection and health
Non-toxic, odorless, noncorrosive

Construction convenience
It can be cut arbitrarily according to the shape of the substrate.

Arc resistance Breakdown Coating System(Air++SH-11)

Product Overview

- The SH-11 Arc resistance Breakdown Coating System consists of base coating, insulating coating, and anti-slip granules, and is suitable for various types of vehicles. The coating is made by using a modified organic silicone resin as the binder and adding inorganic fillers with high-temperature resistance and low thermal conductivity. It has excellent mechanical properties, arc breakdown resistance, and anti-fouling flashover performance.

Performance Index

Category	Item	Technical index	Test method
Coating performance film	Flexibility	≤5mm	GB/T 1731-1993
	X-Cutting test	≤Grade 1	ISO 16276-2 2007
	Tensile strength	≥2.5Mpa	GB/T 528-2009
	Impact resistance	≥50cm	GB/T 1732-1993
	Thermal resistance(150° C±2° C, 1h)	No sagging, no bubbling, no wrinkling, no cracking	GB/T 1735-2009
	10% Sulfuric acid solution, 24h	No bubbling, no discoloration, no loss of gloss, no wrinkling, no shedding	GB/T 9274-1988
	10% Sodium hydroxide solution, 24h	No bubbling, no discoloration, no loss of gloss, no wrinkling, no shedding	GB/T 9274-1988
	10% Acetic acid solution, 24h	No bubbling, no discoloration, no loss of gloss, no wrinkling, no shedding	GB/T 9274-1988
	Salt mist resistance	1000h	GB/T 1771-2007
Functionality	Artificial accelerated aging	1000h	GB/T 14522-2008
	Volume resistivity	≥1.0×10 ¹² Ω • m	GB/T1410
Environmental protection and fire protection	Dielectric strength	≥19KV/mm	HG/T 3330-2012
	Material fire protection	Grade HL3	EN45545
Environmental protection and fire protection	Prohibited and restricted substances	Prohibited and restricted substances	TB/T 3139

Product Advantages

Excellent performance

Excellent electrical insulation, weather resistance, flame retardant

Coating process

The coating process can be used such as scraping coating, roller coating and spraying coating.

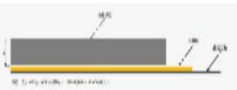

Quick and easy construction

Spraying coating type is suitable for corrugated roof and large arc roof working surface, with fast and efficient construction.

Easy maintenance

The material has excellent re-coating property and easy maintenance.

Technical Scheme

Classification	Classification of coating methods	Insulation layer thickness d(mm)	Suitable vehicle model	Application scenarios	Structure legend
Basic type	Hand coating type	2.0±0.5mm	Metro/Light rail/High speed railway	Flat top/Small arc roof	
	Hand coating type	2~5mm	Electric locomotive	Flat top/Small arc roof	
	Spray coating type	2.0±0.5mm	Metro/Light rail/High speed railway	Arc top/Stainless steel corrugated plate/Facade	
Anti-skid type	Hand coating type	2.0±0.5mm	Metro/Light rail/High speed railway	Flat top/Small arc roof	
	Spray coating type	2.0±0.5mm	Metro/Light rail/High speed railway	Arc top/Facade	

Typical Applications



Corrugated roof spraying construction



Flat top scraping and roller coating construction;

Arc Resistance Insulation Coating(Air++SH-5)

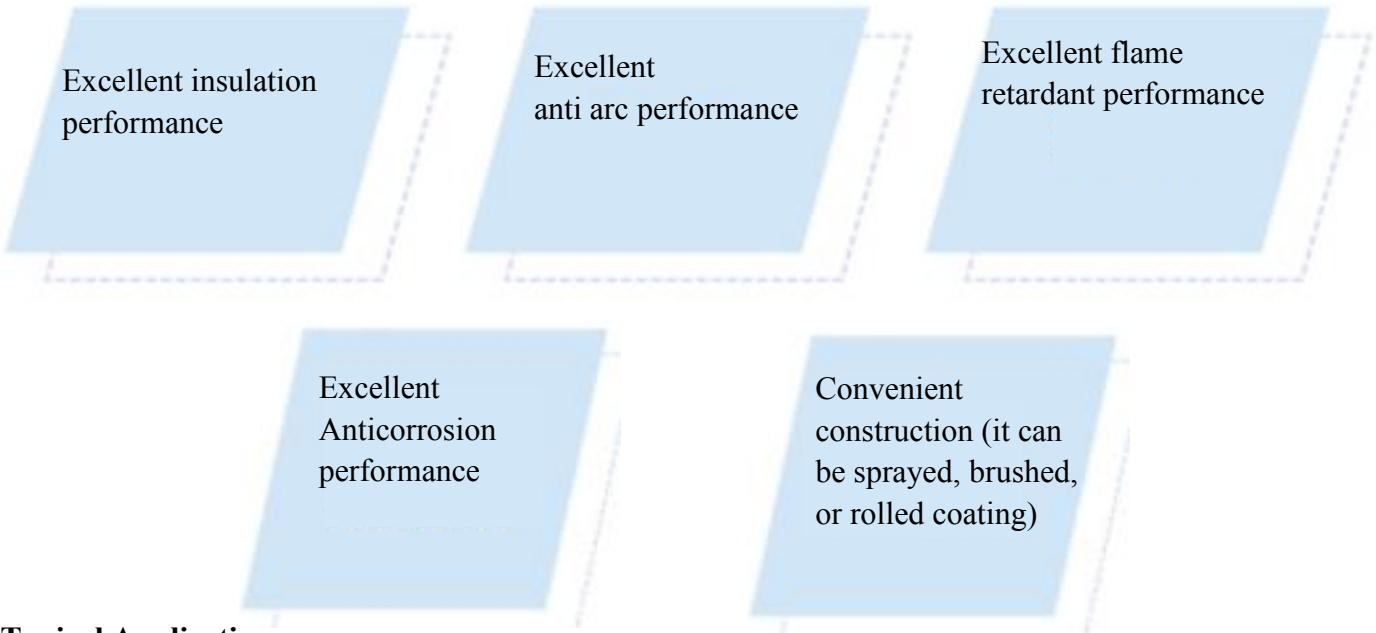
Product Overview

- Air++SH-5 Arc Resistance Insulation Coating is a type of material mainly composed of binders, fillers, and solvents, which has high mechanical strength and good chemical stability. It is resistant to aging, water, and corrosion, and has good insulation performance.

Performance Index

Category	Item	Technical index	Test method
Coating performance	Impact resistance (cm)	50	GB/T 1732-1993
	Adhesive force (grid method, grade)	1	GB/T 9286-1998
	Flexibility (mm)	50	GB/T 1731-1993
Functionality	Breakdown voltage, KV (0.5mm)	17.4	GB/T1408.1-2006
	Dielectric strength, KV/mm	18.2	GB/T1408.1-2006

Product Advantages



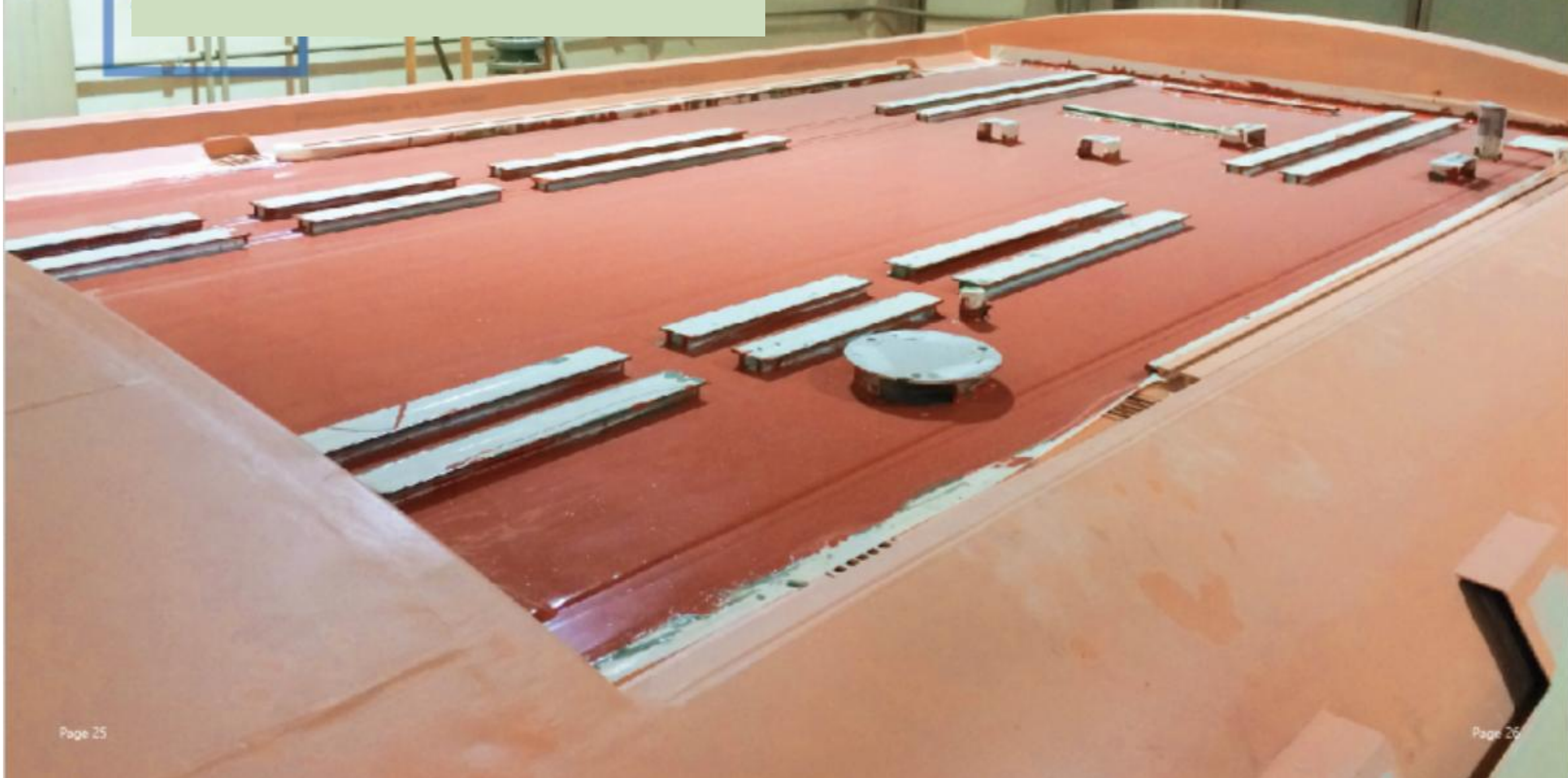
Typical Applications



Application of bogie components

Application of bogie components

Application of Arc Resistance Coatings



Water-based Fire-retardant Coating(Air++3601)

Product Overview

- Air++3601 Water-based Fire-retardant Coating is applied to the fire protection of railway vehicle chassis to improve the fire resistance limit of metal substrates. When a fire occurs, the fireproof coating expands due to heat, forming a layer of flame-retardant expanded carbon with an expansion rate of more than 50 times. This provides good insulation protection for the substrate and saves valuable time for escape and rescue.

Performance Index

Category	Item		Technical index	Test method
Coating performance	Consistency		8-14cm	GB/T1749
	Drying time		≤48h	GB/T1728
Coating performance film	X-cutting test		≤Grade 1	IS016276-22007
	Flexibility		≤50mm	GB/T1748
	Thermal resistance [(100±2)℃,4h]		No sagging, no bubbling, no wrinkling, no cracking	GB/T 1735
	Low temperature impact resistance [(-40±2)℃, 4h]		No stratification, no rupture	Use a ϕ 40mm steel ball to freely drop from a height of 1m
	Resistant to liquids medium [NaCl, 3%(wt), 15d]		No serious softening, no bubbling, no peeling	GB/T9274
	Acid resistance (24h)	H ₂ SO ₄ ,10%(wt)	No bubbling, no softening, no sticking	GB/T9274
	Alkali resistance (24h)	NaOH, 10%(wt)	No bubbling, no softening, no sticking	GB/T9274
Functionality	Structural fire protection requirements	Load-bearing (5T)	≥45min (Thickness 1.2mm)	ASTM E119/NFPA 130
		Non load-bearing	≥45min (Thickness 600 μ m)	EN45545/BS6853
Environmental protection and fire protection	Prohibited and restricted substances		Meet the requirements	TB/T 3139
	Requirements for fire protection of materials		Grade HL3	EN45545-2

Product Advantages

Excellent fireproofing

Excellent fireproofing; Innovative design for fire resistance performance, the formula design combined multiple fire-retardant methods, with significant fire-retardant effects and a fire-resistant board limit of ≥ 45 minutes;

Safe and environmentally friendly

Safety and environmental protection; using water as the dispersing medium, low VOC, and preferred choice for export fireproofing coating

Convenient construction

Convenient construction; Single component design is easy to operate, with high efficiency of mechanical spraying operation and unobstructed construction of complex interfaces

Typical Applications



Expansion effect after fire prevention experiment
(Complete carbonization layer)

Carbonization layer (Expansion ratio>50)



Application of Fire-retardant Coatings In Beijing Winter Olympic Branch Line Project

Water-based Antifogging Coating (Air++3508)

Product Overview

- Air++3508 Water-based Anti-fogging Coating is a multifunctional environmentally friendly coating that integrates multiple properties such as anti-fogging, anti-mould, anticorrosion, flame retardancy, etc. It is composed of hydrophilic high polymer lotion, anti-fogging filler, additives, etc. It has excellent anti-fogging performance and is suitable for various fields such as rail vehicle interiors, building interior walls, air conditioning components, engineering machinery, etc.

Performance Index

Category	Item	Technical index	Test method
Coating performance	Coating appearance	Mix evenly after stirring without any hard lumps	GB/T 9761
	Drying time (Actual drying)	≤48 h /20℃	GB/T 1728
Coating performance film	Adhesive Force Cross-Cut Test	≤Grade 1	GB/T 9286
	Impact resistance	≥50cm	GB/T 1732
	Alkali resistance (5%NaOH, 20℃, 24h)	No cracking, no peeling	GB/T 9274
	Acid resistance (5%H ₂ SO ₄ , 20℃, 24h)	No cracking, no peeling	GB/T 9274
	Thermal resistance (150℃, 1h)	The paint film does not change	GB/T 1735
Functionality	Initial dew point	≥1.5h	HG/T 4560
Environmental protection and fire protection	Limit of harmful substances	Meet the requirements	TB/T 3139
	Material fire prevention requirements	Meet the requirements	TB/T 3237

Product Advantages

Excellent antifogging performance

After the film is formed, it is a porous coating with good air permeability and excellent antifogging performance

Excellent safety

Excellent anti-bacterial and anti-mold performance. It has excellent waterproof and leakproof performance, excellent fire prevention safety, and is non-flammable

Beautiful coating film

The coating film has no cracks, no expansion, and no peeling

Excellent Constructability

The actual drying speed is fast and the construction efficiency is high

Typical Applications



Air++3508 used for windows of high-cold EMU trains

Air++3508 used for air conditioning outlet

Water-based Non-slip Coating(Air++NS201)**Product Overview**

- Air++NS201 Water-based Non-slip Coating is a two-component functional coating based on polyurethane system, mainly used for safety and anti-slip purposes. It is suitable for the exterior of the roofs of rail transit vehicles such as subways, light rails, trams, regular trains, and high-speed trains, as well as places where people are prone to slipping while walking, such as ship decks, concrete ground ramps, leisure areas, and factory workshops.

Performance Index

Category	Item	Technical index	Test method
Coating performance	Drying time(Actual drying)	≤24 h	GB/T 1728-1979
	Non-volatile matter content	≥60%	GB/T 1725-2007
Coating film performance	Impact resistance	≥50cm	GB/T 1732-93
	Scratch test(no sand added)	≤Grade 1	GB/T 31586.2-2015
	Flexibility	≤100mm	GB/T 1731-2020
	Wear resistance (500r/750g)/mg(no sand added)	≤30	GB/T 1768-2006, CS-10 type grinding wheel
	Acid resistance [10%H ₂ SO ₄ (wt), 24h]	The appearance remains basically unchanged	GB/T 9274-1988 First method
	Alkali resistance [10% NaOH (wt), 24h]	The appearance remains basically unchanged	
	Salt water resistance [10%NaCl(wt), 24h]	The appearance remains basically unchanged	
	Water resistance(30d)	No abnormalities	GB/T 1733-1993 First method
	Resistance high-low temperature cycles alternating test (60 cycles)	No bubbling, no rust, no cracking, no shedding, scratch test≤Grade 1	—
	Artificial weathering aging resistance(1000h)	≤Grade 2	GB/T 14522-2008
Functionality	Coefficient of friction	≥1(dry state) ≥0.8(wet state)	GB/T 9263-2020
Environmental protection and fire protection	Prohibited and restricted substances	Meet the requirements	TB/T 3139
	Material fire prevention requirements	Grade HL2	EN45545-2

Product Advantages

Safe and environmentally friendly
Using water as the dispersing medium, low VOC

Excellent chemicals resistance
Excellent chemicals resistance, chemicals resistance>20d

Excellent water resistance
Excellent water resistance performance>30d

Excellent aging resistance
QVB>1500h

Excellent construction performance
Polyurethane sand thick coating 1mm; no bubbling, no burying in sand

Excellent anti-slip performance
It has excellent anti-slip effect in dry and wet conditions, excellent wear resistance, and long-lasting anti slip performance

Typical Applications

- Air++NS201 is suitable for anti-skid of railway vehicle roofs and other parts of the body



Anti-slip on top of train



Anti-slip on top of train



Foot pedal anti-slip



Handle anti-slip



Slope anti-slip



Leisure road anti-slip



Transport vehicle anti-slip



Hand grab anti-slip

Industry	Product Category	Product specifications/models	Demander name	Item name
Rail transit	Damping coating	Water-based Damping Coating(Air++3101D)	CRRC Tangshan Co., Ltd.	Mount Wuyi Metro, Egyptian Multiple Units, Bengal Meter-gage Multiple Units
			CRRC Dalian Co., Ltd.	Dalian Metro Line 1, North Extension of Dalian Metro Line 2 Phase II, South Extension of Shenyang Metro Line 2, Xi'an Metro Line 8
		Water-based Anticorrosion Damping Coating(Air++3101M)	CRRC Qingdao Sifang Co., Ltd.	Tianjin Metro Line 7
			CRRC Changchun Railway Vehicles Co., Ltd.	160 kilometer power concentrated Multiple Units
			CRRC Chengdu Co., Ltd.	Railway passenger car repair
			CRRC Xi'an Co., Ltd.	Railway passenger car repair
			Liuzhou Locomotive and Rolling Co., Ltd.	Railway passenger car repair
			CRRC Datong Co., Ltd.	New locomotive dispatch;
			CRRC Ziyang Co., Ltd.	New locomotive dispatch;
			CRRC Luoyang Co., Ltd.	Locomotive repair
	Insulation coating	Arc Resistance Breakdown Coating System (SH-10/SH-11)	CRRC Qingdao Sifang Co., Ltd.	Chengdu Metro Line 6, Zhengzhou Metro Suburban Line, Chengdu Metro Line 17, Chengdu Metro Line 18, Chengdu Metro Line 11, Shijiazhuang Metro Line 2, Purchase of additional vehicles for Guangzhou Metro Line 6, Overhaul of Chongqing Metro Line 1, Tianjin Metro Line 10, Purchase of additional vehicles for Guangzhou Metro Line 5, Purchase of additional vehicles for Guangzhou Metro Line 7, Zhengzhou Metro Line 17, Zhengzhou Metro Line 10, Zhengzhou Metro Line 12, Chengdu Metro Line 19, Chengdu Metro Line 17 Phase III, Chengdu Metro Line 18 Phase II, Chengdu Metro Line 27, Chengdu Ziyang Region Vehicle, Tianjin Metro Line 7, Tianjin Metro Jinghai Line, Purchase of additional vehicles for Tianjin Metro Line 9, Zhengzhou Metro Line 7, Zhengzhou Metro Line 8, Purchase of additional vehicles for Tianjin Metro Line 5, Jinan Metro Line 4, Overhaul of Zhengzhou Metro Line 1
			CRRC Zhuzhou Locomotive CO.,Ltd.	Wuhan Metro Line 6, Kunming Metro Line 1, Supplement to Shenzhen Line 1, Supplement to Shenzhen Line 11, Guangzhou Metro Line 7, Guangzhou Metro Line 9, Changsha Metro Line 1, Changsha Metro Line 2, Ningbo Metro Line 1, Ningbo Metro Line 2, Harmony Locomotive C6 Repair, Power engineering vehicle
			CRRC Tangshan Co., Ltd.	Tianjin Metro Line 5, Shijiazhuang Metro Line 1, Xiamen Metro Line 2, Fuzhou Metro Line 1, Tianjin Metro Line 4
			Chengdu Changke Xinzhu Railway Vehicles Equipment Co.,Ltd.	Chengdu Metro Line 5, Chengdu Metro Line 8, Chengdu Metro Line 3, Chengdu Metro Line 9
			CRRC Dalian Co., Ltd.	Dalian Metro Line 1, Dalian Metro Line 2, Xi'an Metro Line 1, Xi'an Metro Line 8, Taiyuan Metro Line 1, Tianjin Metro Line 4
			Shanghai Alstom Traffic Equipment Co., Ltd.	Shanghai Metro Line 5, Pudong Airport MRT Line, Shanghai Metro Line 15
			Beijing Subway Rolling Stock Equipment Co., Ltd.	Beijing Subway Yizhuang Line, Overhaul of Beijing Metro Line 6
			Hebei Jingche Rail Transit Vehicle Equipment Co., Ltd.	200 Urban Region Multiple Units, Beijing Metro Line 12, Beijing Metro Line 3

Industry	Product Category	Product specifications/models	Demander name	Item name
Rail transit	Fireproof coating	Water-based Fire-retardant Coating(Air++3601)	CRRC Changchun Railway Vehicles Co., Ltd.	Chongqing Bitong Line, Shenzhen Metro Line 11 Phase II, Changchun Metro Line 2, Changchun Metro Line 6, Xiamen Metro Line 4, Xiamen Metro Line 6, Wuhan Metro Line 7, Guangzhou Metro Line 2, and Chengdu Metro Line 8;
			CRRC Tangshan Co., Ltd.	Tianjin Metro Line 1, Tianjin Metro Line B1, Argentine Jujuy New Energy Light Rail Train, New Urban Rapid Transit Development Project, and Fuzhou Metro Line 4
			CRRC Dalian Co., Ltd.	Taiyuan Metro Line 1, Taiyuan Metro Line 2, Nagpur Metro in India
			Hebei Jingche Rail Transit Vehicle Equipment Co., Ltd.	Beijing Metro Line 22, Beijing Metro Line 13, Hydrogen energy hybrid vehicles, Beijing Winter Olympics Line 11
	Anti-skid coating	Water-based anti-skid coating (NS201)	CRRC Dalian Co., Ltd.	Xi 'an Metro Line 8, Taiyuan Metro Line 1, Tianjin Line Z4, Shenyang Line 1, Shenyang Line 3, Dalian Metro Line 5, Shenyang Metro Line 4, South extension of Shenyang Metro Line 2 , Xi 'an Metro Line 2, North Extension of Dalian Metro Line 2 Phase II , Dalian Metro Line 1
			Hebei Jingche Rail Vehicle Equipment Co., Ltd.	Beijing Metro Line 13, 200km High-speed Urban EMU Train
			CRRC Zhuzhou Locomotive Co., Ltd.	Qingdao Metro Line 6 Engineering Vehicle
Automobile	Damping coating	Multifunction Water-based Damping Coating(Air++3101)	China North Industries Group Corporation 53rd Research Institute	Vibration and noise reduction in military vehicle carriages
		Multifunction Water-based Damping Coating(Air++3101)	Beijing Hanotis Special Vehicle Co., Ltd.	RV vibration and noise reduction
		Multifunction Water-based Damping Coating(Air++3101)	Lonking (Shanghai) Machinery Manufacturing Co., Ltd.	Loader vibration and noise reduction
		Multifunction Water-based Damping Coating(Air++3101)	Taian Hengda Machinery Co., Ltd.	Road roller noise reduction
		Multifunction Water-based Damping Coating(Air++3101)	7817 Factory	Automobile chassis and hood
Shipping	Damping coating	Multifunction Water-based Damping Coating(Air++3101)	Shanghai Shenhua Acoustic Equipment Co., Ltd.	Ships fan room, harbor supervision working ship accommodation, and yacht main engine room sound insulation cover
		Multifunction Water-based Damping Coating(Air++3101)	First Light Technology Group Co., Ltd.	Yacht cabins and meeting rooms
		Multifunction Water-based Damping Coating(Air++3101)	Taizhou Zhongxing Shipyard	Passenger ship accommodation
		Multifunction Water-based Damping Coating(Air++3101)	Zhuhai Haizhima Yacht Manufacturing Factory	Yacht cabins and meeting rooms
Electricity	Damping coating	Multifunction Water-based Damping Coating(Air++3101)	Yunnan Yuxi New and Special Materials Co., Ltd.	Power equipment sound insulation cover for vibration and noise reduction
			Shanghai Shenhua Acoustic Equipment Co., Ltd.	Substation sound insulation screen
Road and bridge	Damping coating	Multifunction Water-based Damping Coating(Air++3101)	Shanghai Red Flag Machine Screening Factory	Urban viaduct sound insulation screen
			Tianjin Zaifa Acoustic Soundproofing Wall Co., Ltd.	Expressway sound insulation screen
Others	Damping coating	Multifunction Water-based Damping Coating(Air++3101)	China First Heavy Machinery Co., Ltd.	Industrial factory soundproof room
	Damping coating		Yunnan Kunming Ship First Machinery Co., Ltd.	Airport baggage transfer system vibration and noise reduction
	Damping coating		Weihai Guangtai Airport Equipment Co., Ltd.	Airport baggage transfer system vibration and noise reduction
	Damping coating		Shenzhen Tianxing Sida Technology Co., Ltd.	Airport baggage transfer system vibration and noise reduction in Shenzhen
	Damping coating		JIER Machine-Tool Group Co., Ltd.	Automotive intelligent stamping line vibration and noise reduction
	Damping coating		XCMG Construction Machinery Co., Ltd.	Vibration reduction of roller engine hood
	Damping coating		Shanghai Puchao Construction and Installation Engineering Co., Ltd.	The 4D cinema project of the Petroleum Pavilion at the Expo 2010 Shanghai