

PRODUCT DATA SHEET

ART-JT1

Anti-Rebound Agent

Description

ART-JT1 is a newly developed anti-rebound agent for shotcrete by ARIT. It contains components such as adhesion enhancement, rapid setting, strength improvement, and waterproofing. It has excellent properties of increased adhesion, water retention, and early strength. It can reduce the dosage of accelerators, does not rust reinforcement steel, does not pollute the environment, and does not harm the health of workers. It significantly reduces the rebound rate of shotcrete, has a certain early strength effect without adversely affecting the later strength, and can effectively improve work efficiency and reduce project costs. It is especially suitable for shotcrete construction under conditions of high rebound rates and water seepage. Compared with similar products on the market, it has obvious advantages in terms of technical performance and cost-effectiveness.

Main benefits/Characteristics

- It has a good effect on reducing the rebound rate of shotcrete, significantly lowering the overall cost, with a rebound rate of $\leq 10\%$ for shotcrete.
- It has a significant adhesion-enhancing effect, ensuring good workability of the fresh concrete, maintaining its fluidity, cohesiveness, water retention, and slump to meet construction requirements.
- It has a certain early strength effect, with a 1-day compressive strength ratio of shotcrete $\geq 120\%$, without affecting the later strength. The 28-day compressive strength ratio can reach over 100%.

- It has a micro-compensating shrinkage function, effectively preventing cracking after shotcrete formation.
- It improves the durability indices of shotcrete, such as water resistance and freeze-thaw resistance.
- It produces less dust and has no irritating odor, creating a good working environment for workers. The product is neither strongly acidic nor strongly alkaline, does not rust reinforcement steel, and does not pollute the environment.
- The product is environmentally friendly: The production process is non-toxic and harmless, making it a green and environmentally friendly product that is conducive to sustainable development.

Applications

Underground Engineering: Support and lining of shotcrete for mine tunnels, transportation tunnels, hydraulic tunnels, subways, and various types of caverns (such as underground power stations, warehouses), as well as waterproofing and leakage control projects.

Application Cases

Suzhou Yangtze River Road Project - A Certain Tunnel

1. Original Mix Design for Shotcrete

Table 1: Mix Design for C25 Shotcrete

kg/m ³	Cement	Sand	Crushed Stone	PCE	Accelerator	Water
C25 Shotcrete	450	922	755	4.5	36	180



Spraying Effect

Table 2: Statistics of Shotcrete Rebound Rate

Spraying Location	Spraying Volume	Rebounding Volume	Accelerator Dosage	Rebound Rate
Side Wall/Arch Foot	12 m ³	>4 m ³	6%	>33.3%

Spraying Effect: The first batch of 12 m³ of sprayed concrete, using the original C25 mix design without the rebound reducing agent, was sprayed at the side wall/arch foot position of the upper step. The actual dosage of accelerator was 6%, with severe block dropping. The rebound volume was greater than 4 m³, and the spraying rebound rate exceeded 33.3%.

2.Mix Design for Shotcrete with anti-rebound agent

Table 3: Optimized Mix Design for C25 Shotcrete

kg/m3	Cement	Sand	Crushed Stone	PCE	Accelerator	Anti-rebound Agent	Water
C25 Shotcrete	450	922	755	4.5	36	18	180



Spraying Effect

Table 4: Statistics of Shotcrete Rebound Rate

Spraying Location	Spraying Volume	Rebounding Volume	Accelerator Dosage	Rebound Rate
Arch Waist/Arch Crown	15 m ³	1 m ³	5.5%	6.7%

Spraying effect: The second batch of 12 m³ of sprayed concrete, using the optimized C25 mix design with 4% anti-rebound agent, was sprayed at the arch waist/arch crown position of the upper step. The actual dosage of accelerator was 5.5%, with no block dropping. The rebound volume was less than 1 m³, and the spraying rebound rate was approximately 6.7%.

3. Comprehensive Comparison

Table 5: Comparison of Spraying Effects

	Spraying Location	Spraying Volume	Rebounding Volume	Accelerator Dosage	Rebound Rate	Cost per m ³ (CNY)
Original Mix	Side Wall/Arch Foot	12 m ³	>4 m ³	6%	>33.3%	746
With Rebound Reducing Agent	Arch Waist/Arch Crown	15 m ³	1 m ³	5.5%	6.7%	646

Conclusion: The comprehensive cost per cubic meter of sprayed concrete is reduced by more than 100 CNY.

A Certain Tunnel of the Sichuan-Tibet Railway

1. Original Mix Design for Shotcrete

Table 1: Mix Design for C25 Shotcrete

kg/m ³	Cement	Sand	Crushed Stone	PCE	Accelerator	Water
C25 Shotcrete	473	926	789	4.73	37.84	180



Spraying Effect

Table 2: Statistics of Shotcrete Rebound Rate

Spraying Location	Spraying Volume	Rebounding Volume	Accelerator Dosage	Rebound Rate
Upper Step	25 m ³	5 m ³	8.2%	20%

Spraying Effect: Using the original C25 mix design without the anti-rebound agent, the total spraying volume was 25 m³. The accelerator dosage was 8.2%. The sprayed material had poor adhesion, with many blocks falling off at the arch waist and arch crown. The surface flatness was poor, and the overall rebound rate was 20%.

2. Mix Design for Shotcrete with anti-rebound agent

Table 3: Optimized Mix Design for C25 Shotcrete

kg/m ³	Cement	Sand	Crushed Stone	PCE	Accelerator	Rebound Reducing Agent	Water
C25 Shotcrete	473	926	789	4.73	37.84	18.92	180



Spraying Effect

Table 4: Statistics of Shotcrete Rebound Rate

Spraying Location	Spraying Volume	Rebounding Volume	Accelerator Dosage	Rebound Rate
Arch Waist/Arch Crown	22 m ³	1 m ³	6.8%	4.5%

Spraying Effect: 22 m³ of sprayed concrete was used with optimized C25 mix design with 4% anti-rebound agent. The sprayed concrete had good cohesiveness. It was sprayed on the upper-middle bench. The dosage of accelerator was 6.8%, and the sprayed material had good setting and hardening effects, with no block dropping. The surface flatness was good, the rebound volume was less than 1 m³, and the spraying rebound rate was approximately 4.5%.

3. Comprehensive Comparison

Table 5: Comparison of Spraying Effects

	Spraying Location	Spraying Volume	Rebounding Volume	Accelerator Dosage	Rebound Rate	Cost per m ³ (CNY)
Original Mix	Upper Step	25 m ³	5 m ³	8.2%	20%	716
With Anti-rebound Agent	Upper-Middle Step	22 m ³	1 m ³	6.8%	4.5%	666

Conclusion: The comprehensive cost per cubic meter of sprayed concrete is reduced by approximately 50 CNY.

Physical and chemical indicators

Items	Performance
Appearance	Milky white or light yellow
pH	6.0±1.0
Chloride ion content	≤0.1%

Physical indicator: The product is a liquid, non-toxic, non-irritating, and non-flammable.

Chemical indicator: pH: 6.0±1; Chloride ion content ≤0.1%.

Recommended Dosage

The dosage range of this product is 2%~6% (based on the weight of the cementitious materials). The optimal dosage can be determined within the recommended range according to the compatibility with cement, temperature changes, and construction techniques.

Instructions for Use

1. The dosage must be correctly added according to the mix design ratio. During construction, water should be deducted based on the solid content, and the dosage of the water reducer may be adjusted appropriately.
2. This product should be added during the mixing of concrete at the batching plant, without affecting the workability retention. When used in combination with accelerator during the spraying process, it can exert a synergistic effect, shortening the setting time and increasing the interlayer bond strength.
3. During spraying, it is essential to follow the standard operating procedures, paying attention to the uniformity, smoothness, and density of the sprayed material.
4. When used in combination with other admixtures, compatibility tests should be conducted first to avoid reactions that may cause precipitation or blockages in the pipes.
5. When using this product, appropriate curing should be carried out based on the conditions and requirements of the project, if necessary.

6. The construction temperature should be controlled above 5°C to avoid low-temperature construction that may affect the performance of the product.

Packaging

This product is liquid and can be packaged and transported in plastic drums, iron drums, or tanker trucks. Special packaging can also be provided according to customer requirements.

Storage

During storage, prevent freezing or direct exposure to sunlight. The storage temperature should be between 5°C and 35°C, with a shelf life of three months.

LEGAL NOTES

It is prohibited to retain or disclose samples of the product without the company's permission.

In addition to the product quality itself, the actual performance also depends on other factors.

If there are factors beyond our control, we cannot guarantee the performance of the product.

Users are requested to strictly follow the technical guidelines and product instructions for use. The company shall not be held liable for any consequences resulting from unauthorized changes to the product's usage without the company's authorization.