

ProNode™

PRODUCT DESCRIPTION

Embedded sacrificial anodes can be used in both new reinforced concrete structures and concrete repair/rehabilitation works to provide galvanic cathodic protection to reinforcing steel and reduce ongoing corrosion activity. The product consists of a high-purity zinc anode ($Zn \geq 99.995\%$), prefabricated high-alkaline activating mortar, a special pore-former material, and steel wires. During manufacturing, the zinc anode surface is specially treated to maintain electrochemical activity and promote uniform anode consumption. During installation, the steel wires at both ends of the embedded sacrificial anode are connected to the reinforcing steel. After concrete or repair mortar placement, the activating mortar helps activate the zinc anode allowing it to continuously supply protective current to the reinforcing steel and reduce corrosion activity.

PRODUCT FEATURES

Anode Activity & Stability

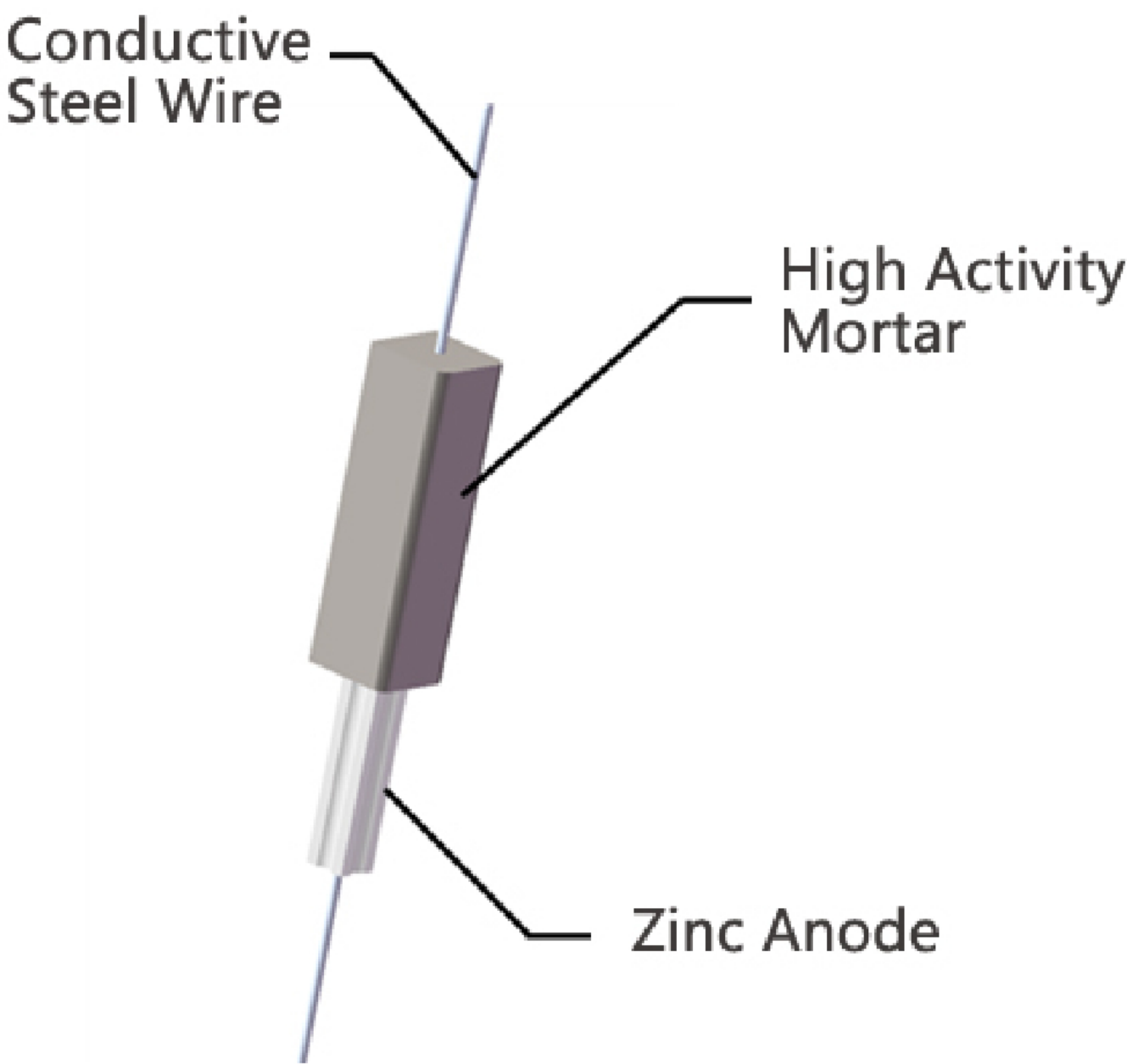
- High anode activity and rapid activation support stable potential and current output throughout operation.

Structural Integration

- Embedded design allows direct installation in concrete, supporting reliable long-term performance.



EMBEDDED SACRIFICIAL ANODE



PRODUCT PERFORMANCE

Electrochemical Performance

- Negative open-circuit potential no less than -1100 mV (vs. SCE), providing sufficient driving potential for cathodic protection of reinforced concrete.

Environmental Compatibility

- Suitable for high-alkaline mortar environments ($\text{pH} \geq 12$, resistivity $< 100\ \Omega \cdot \text{m}$), ensuring stable current distribution.

Service Life & Safety

- Designed service life ≥ 10 years; corrosion products are uniformly dispersed to avoid expansion stress and damage to concrete structures.

Reference	Title
ASTM B418-16A(2021)	STANDARD SPECIFICATION FOR CAST AND WROUGHT GALVANIC ZINC ANODES
NACE SP0216-2023	GALVANIC CATHODIC PROTECTION OF REINFORCING STEEL IN ATMOSPHERICALLY EXPOSED CONCRETE STRUCTURES
ISO 12696:2022	CATHODIC PROTECTION OF STEEL IN CONCRETE - SYSTEM PERFORMANCE REQUIREMENTS WHERE FULL CATHODIC PROTECTION IS SPECIFIED
NACE SP0408-2019	CATHODIC PROTECTION OF REINFORCING STEEL IN BURIED OR SUBMERGED CONCRETE STRUCTURES

Parameters

Current Output

A galvanic coupling test was conducted using reinforcing steel, concrete, and embedded sacrificial anodes. The anode output current was monitored during the concrete curing period within 30 days after concrete placement, and again after 6 months of continuous coupling operation. The results show that:

- During the early stage after concrete placement, the output current of the embedded sacrificial anode reached 5,000 μA , rapidly polarizing the reinforcing steel. The output current then gradually decreased and eventually stabilized at 720 μA , while the reinforcing steel potential stabilized at approximately -420 mV.
- After 6 months of coupling operation, the anode output current stabilized at 60-120 μA , with minor fluctuations due to changes in temperature and humidity. The reinforcing steel potential stabilized at approximately -400 mV to – 440 mV.

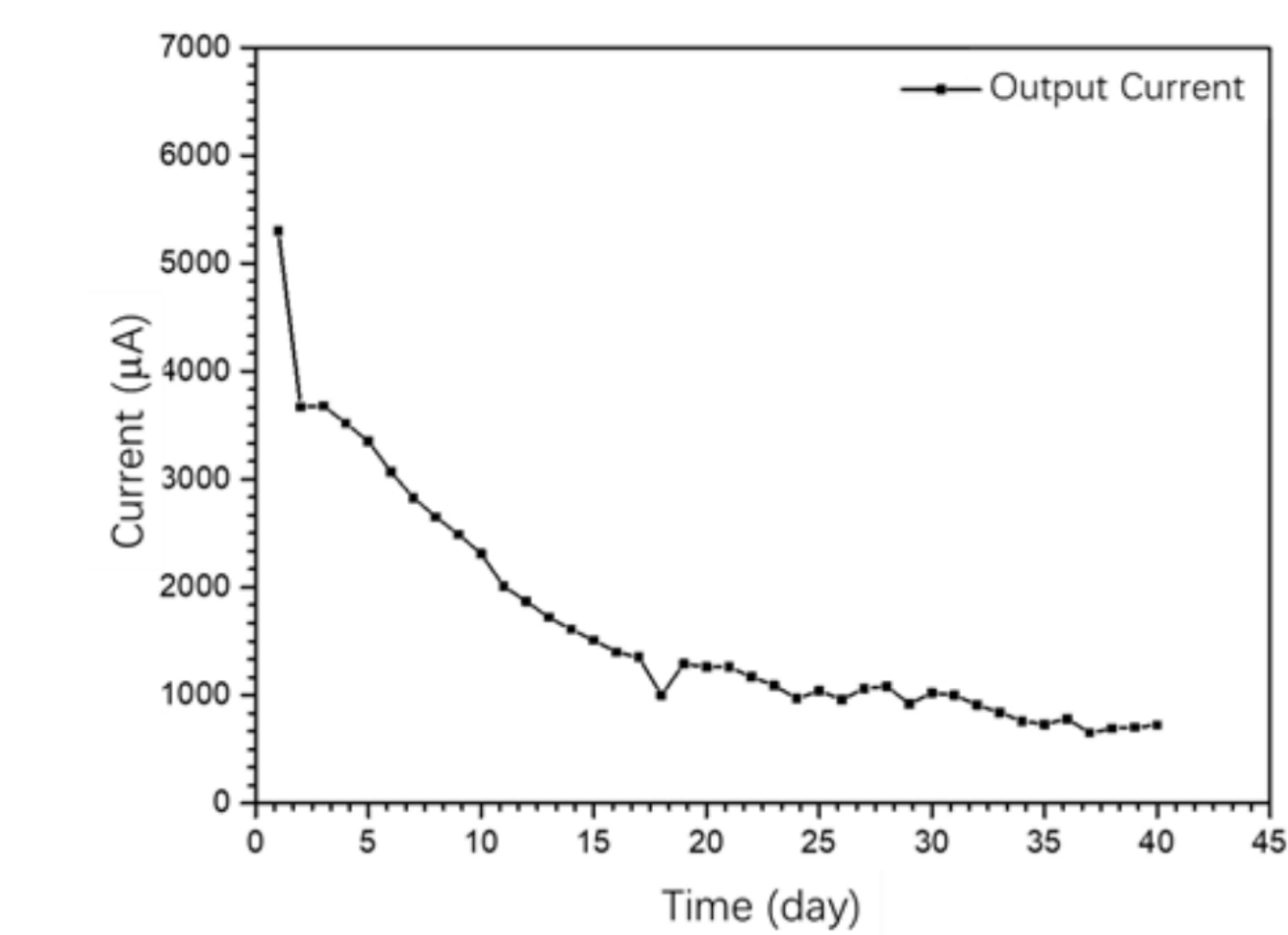


Figure 1. Curing period

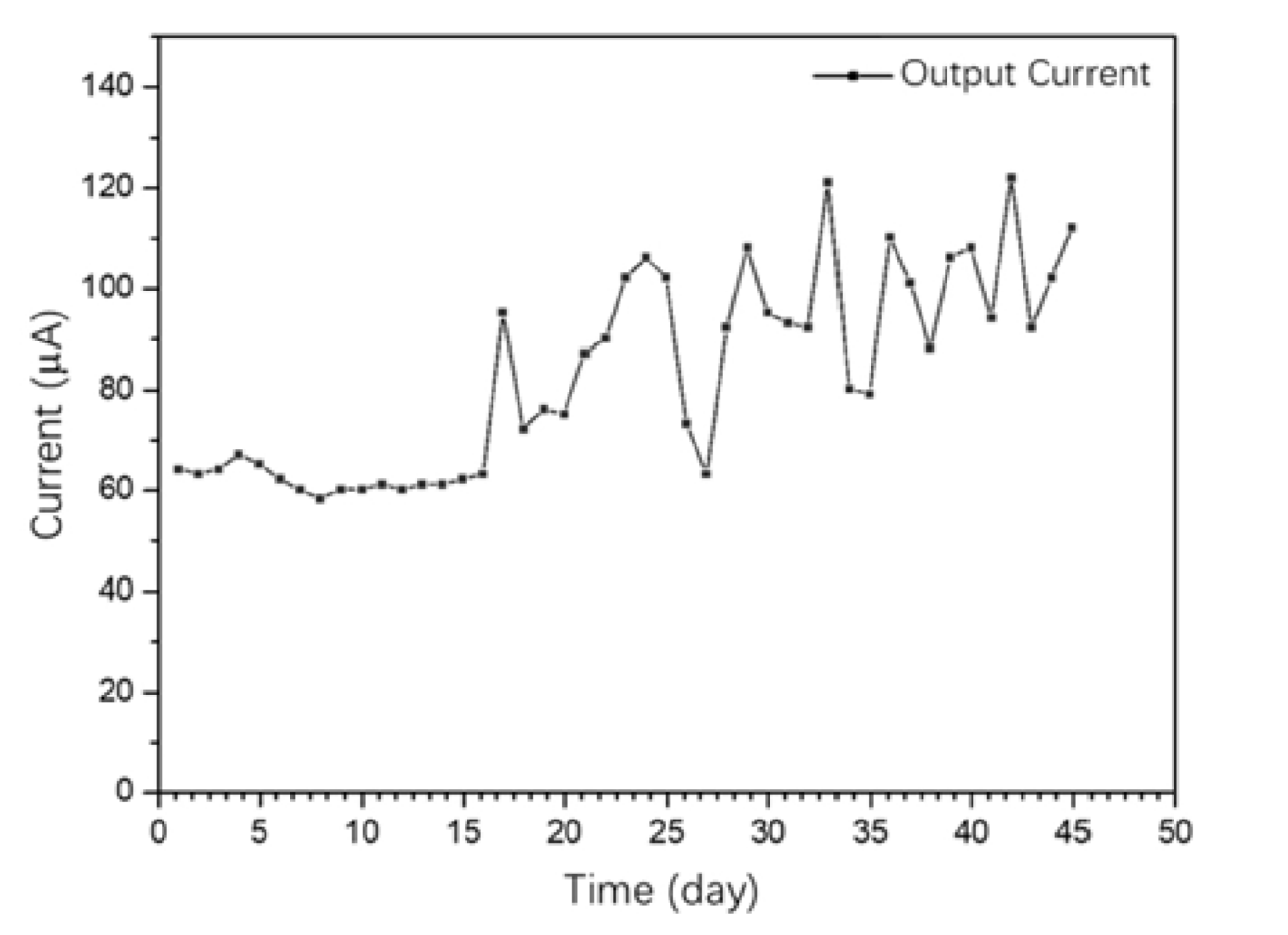


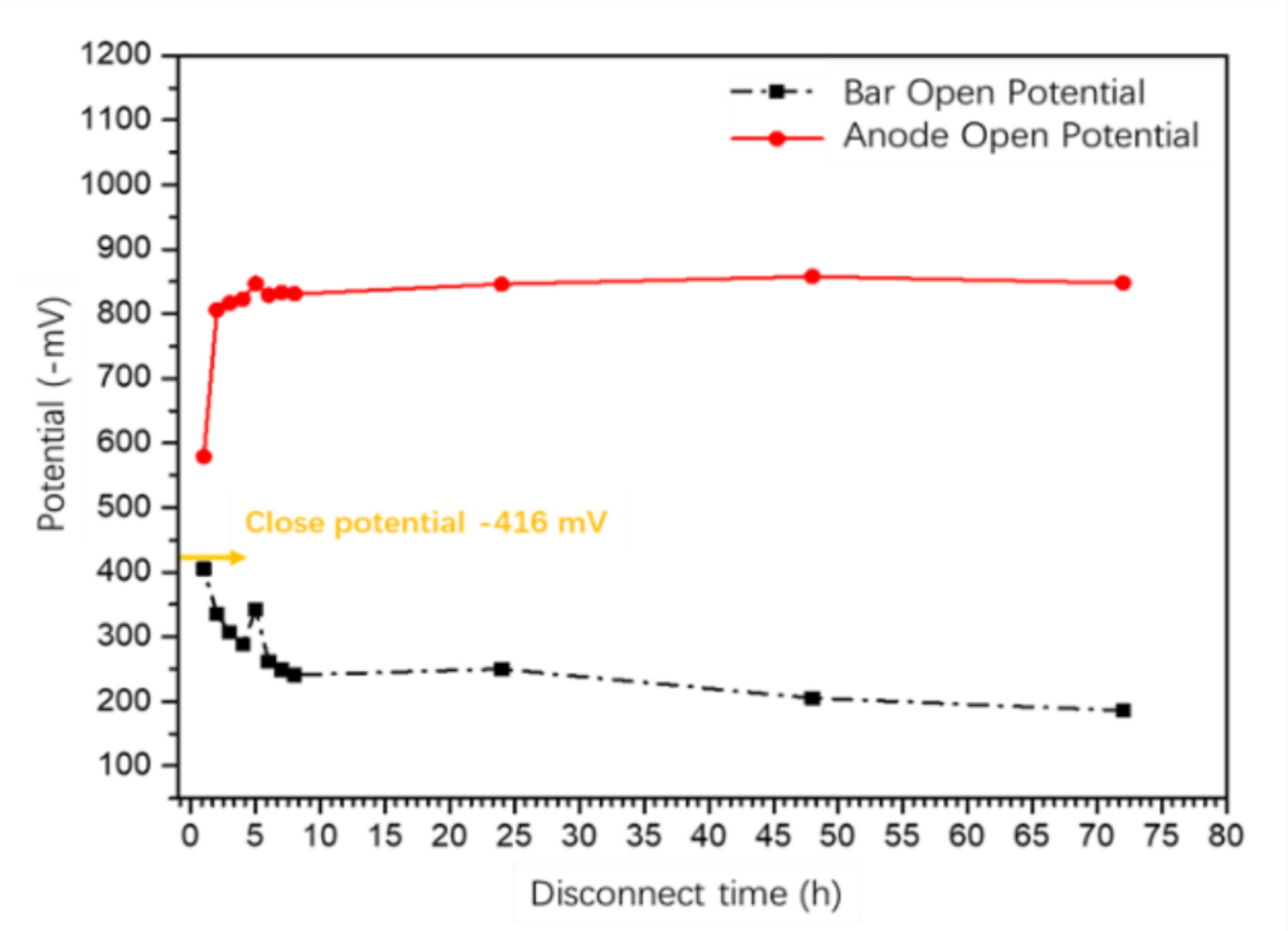
Figure 2. After 6 months of coupling

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Protective Potential

According to NACE SP0216, the depolarization potential shift of the reinforcing steel should be greater than 100 mV. Based on this criterion, the open-circuit potentials of the reinforcing steel and anodes were continuously monitored over multiple test periods, and the results met the specified requirements. After recoupling, the closed-circuit potential of the reinforcing steel recovered to approximately -440 mV.

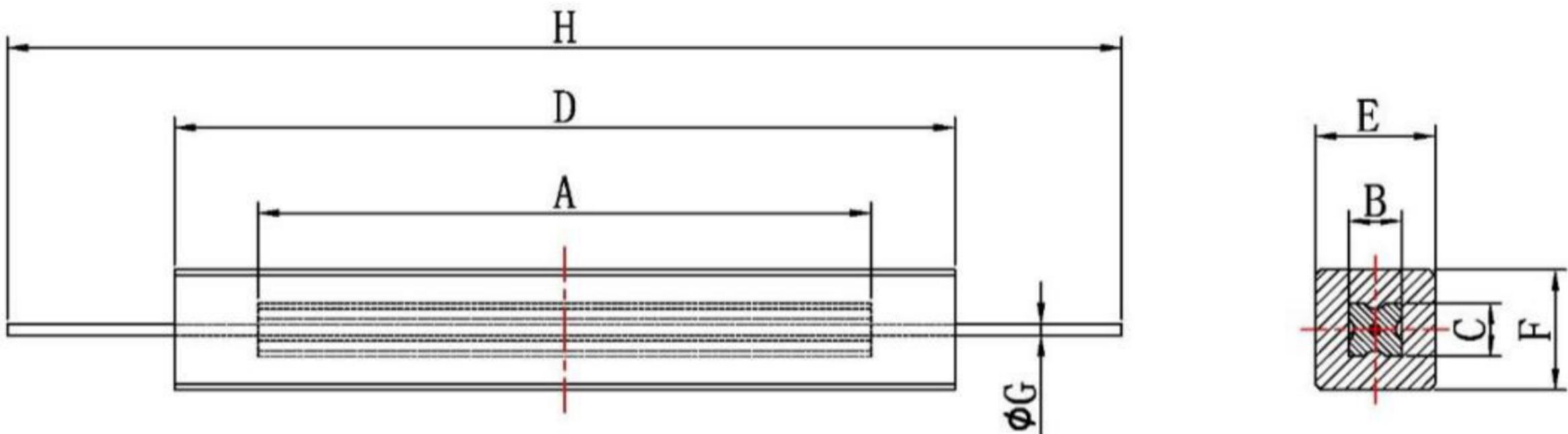


Models and Specifications

For the protection of new reinforced concrete structures and the rehabilitation of existing reinforced concrete structures, Advance Technology offers standard-size embedded sacrificial anodes as well as customized products.

Embedded sacrificial anodes for the protection of new concrete structures

Model	Zinc core size (mm)	Anode size (mm)	Core size (mm)		Zinc core weight (g)	Anode weight (g)
	A×B×C	D×E×F	G	H		
AT-RP-N-01	40×15×10	60×25×20	2	460	38	107
AT-RP-N-02	60×15×10	80×25×20	2	480	58	144
AT-RP-N-03	90×15×10	110×25×20	2	510	87	200
AT-RP-N-04	40×25×20	60×35×30	2	540	138	253

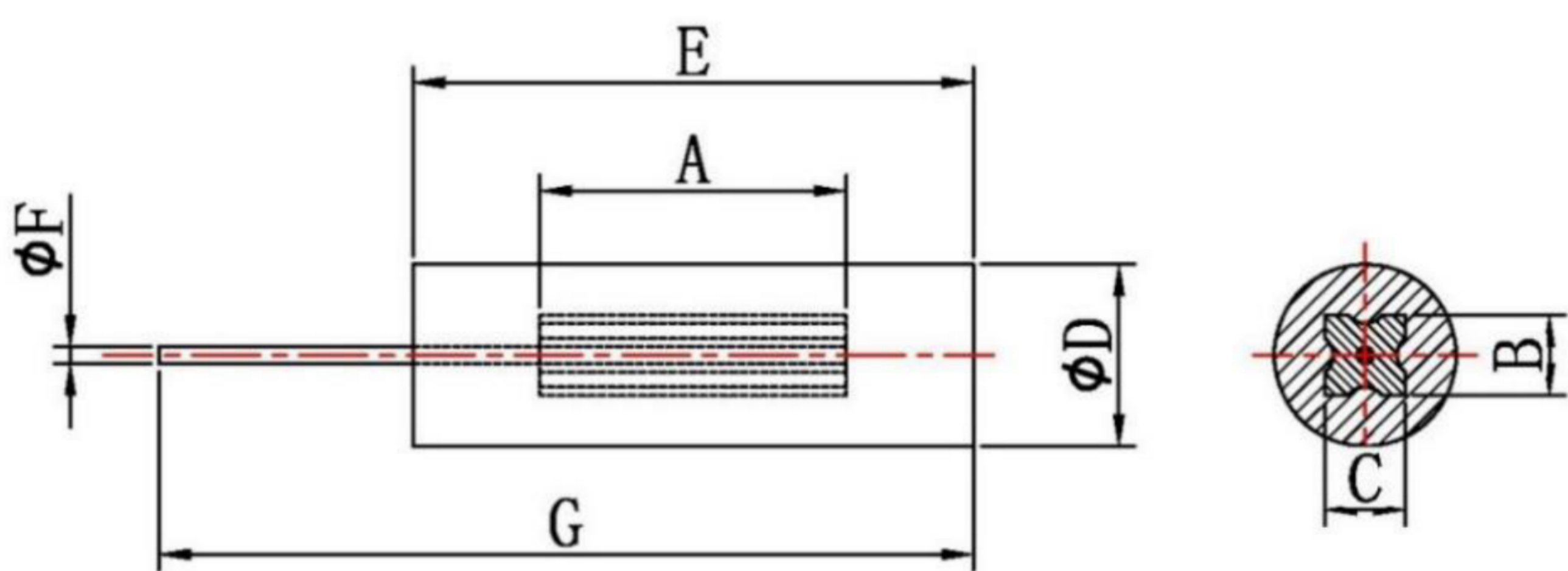


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Embedded sacrificial anodes for the rehabilitation of existing concrete structures

Model	Zinc core size (mm)	Anode size (mm)	Core size (mm)		Zinc core weight (g)	Anode weight (g)
	A×B×C	D×E	F	G		
AT-RP-R-01	10×25×25	45×20	2	220	43	125
AT-RP-R-02	25×25×25	45×35	2	235	109	248
AT-RP-R-03	30×30×30	50×40	2	240	189	383
AT-RP-R-04	40×30×30	50×50	2	250	253	494



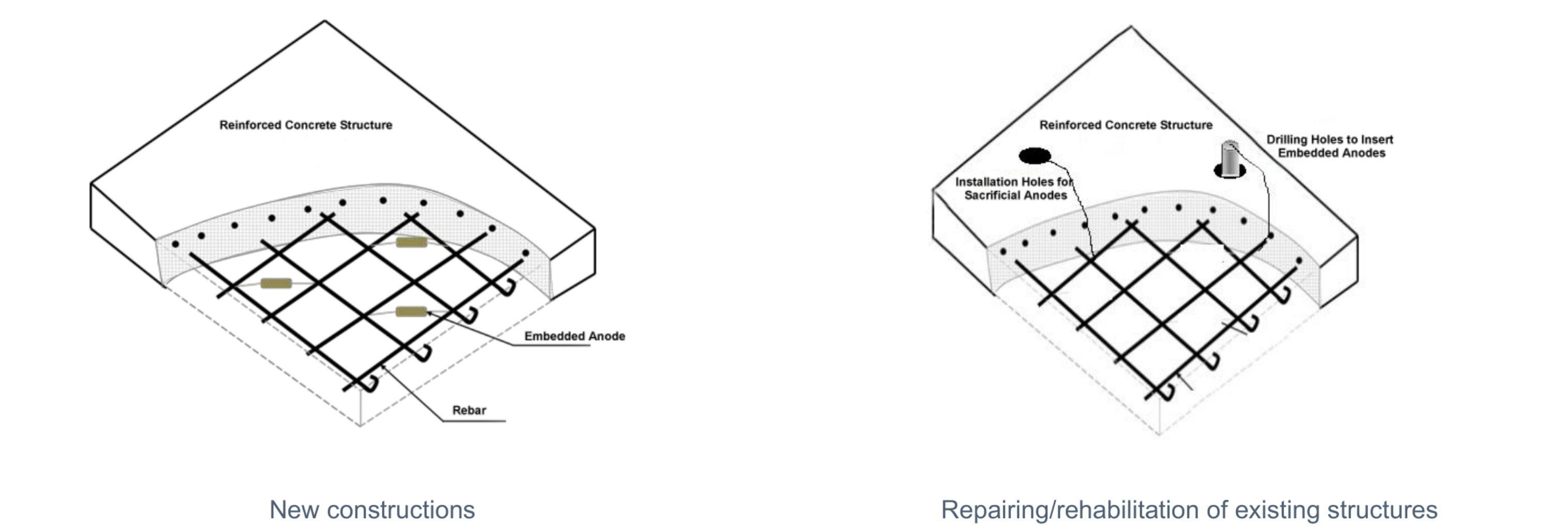
Arrangement Spacing

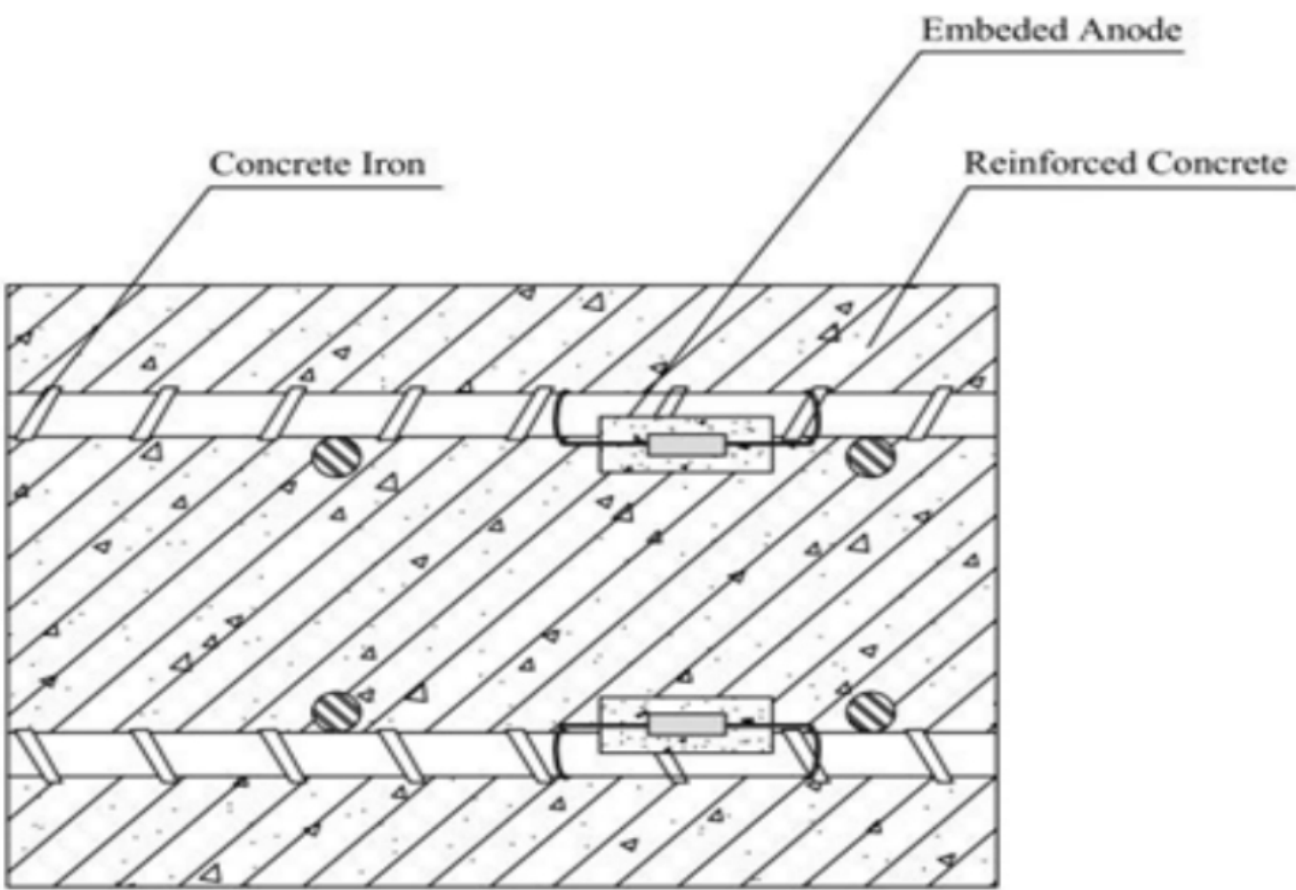
The spacing of embedded anodes is affected by factors such as reinforcing steel area, exposure severity, temperature, selected anode model, and other project-specific conditions. The following table provides recommended maximum anode spacing for reference. Final anode spacing shall be confirmed based on project-specific design requirements. Please consult Advance Technology for project-specific spacing recommendations.

Highly corrosive environment		Moderate and low corrosive environments	
Rebars area/Concrete area	Max Anode Spacing (mm)	Rebars area/Concrete area	Max Anode Spacing (mm)
< 0.20	700	<0.2	750
0.21-0.46	680	0.21-0.46	700
0.47-0.70	610	0.47-0.70	650
0.71-0.93	560	0.71-0.93	600
0.94-1.15	500	0.94-1.15	550
1.16-1.36	480	1.16-1.36	500
1.37-1.56	450	1.37-1.56	480
1.57-1.75	450	1.57-1.75	480
1.75-1.93	430	1.75-1.93	450
1.94-2.1	430	1.94-2.1	430

Installation Diagram

- Before installation, wet the external mortar of the anode with clean water to facilitate rapid activation.
- Handle the anode with care during installation.
- Ensure electrical continuity throughout the reinforcing steel network.
- Securely connect the exposed steel wires of the anode to the reinforcing steel to maintain good electrical continuity.

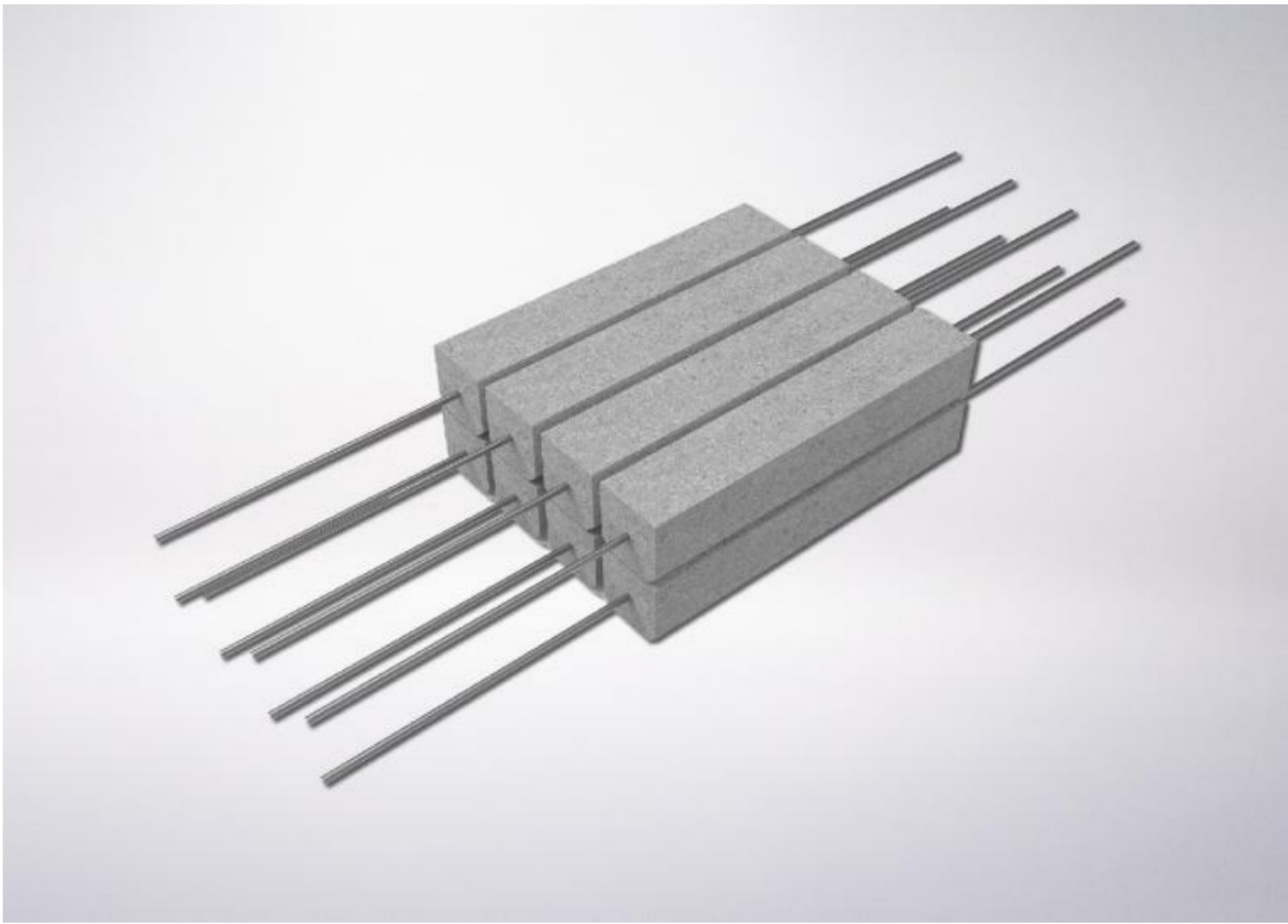




Installation Diagram



Installation Diagram



Canada

290 North Queen St
Suite 208,
Etobicoke, Ontario
Canada, M9C 5L2

Phone: + 1 416 433 3186

advance-technology.com

consult@advance-tech.ca

For further information, please contact Advance Technology.

