

BEKAERT

better together

COATING SOLUTIONS FOR ACTIVE CORROSION RESISTANCE

Beating corrosion together



BEKAERT COATING TECHNOLOGIES

Bekaert utilizes two methods for applying metallic coatings:

HOT-DIP COATING:

The oxide-free steel wire passes through a molten zinc bath until the coating has the right thickness. Bezinal® coated wires pass through an additional zinc-aluminum bath before controlling and cooling.

ELECTRO-PLATING:

The steel wire passes through a chemical solution that contains the corresponding ions of the metallic coating. Next, electricity dissolves the anodes in the metal and transfers the ions onto the wire.

Protected by Bezinal®

To achieve the best possible active corrosion resistance Bekaert offers Bezinal®, our own range of zinc aluminum coatings. Bezinal® offers the best performance in terms of corrosion and heat resistance, durability and processability.

Depending on the application, Bekaert offers five types of Bezinal®:

- Bezinal® : 95% Zn/5% Al – The standard in high corrosion resistant coating solutions
- Bezinal® 2000: 90% Zn/10% Al – Superior protection in high corrosion environments
- Bezinal® 3000 – Zn/Al/Mg – Maximum corrosion protection
- Bezinal® XP* – Superior corrosion resistance for critical springs
- Bezinal® XC* – Resilient corrosion resistance that withstands severe coiling procedures

* For more information about Bezinal® XP and Bezinal® XC, coatings for critical springs, get in touch with your local Bekaert representative via our website www.bekaert.com.

Why choose Bekaert?

Your partner in coating solutions

Bekaert offers a wide range of coatings to meet any type of environment. Active, passive or combined, we can create the most efficient and cost-effective corrosion prevention solution for your application.

Customer-driven innovation

Together with customers and independent research partners, we are able to create new coating solutions that keep up with industries' evolving needs. Our in-house engineering department develops machinery, testing and process equipment to bring those new products to reality.

Advanced testing capabilities

Through exposition and electrochemical techniques, lab technicians in our R&D facilities test the influence of different corrosive elements on the quality and service life of our products in different applications. Besides the standard tests, our labs can also develop specific tests on customer request and perform outdoor exposure.



EXPECTED LIFETIME IN DIFFERENT CORROSION CLASSES

The environment heavily influences corrosion processes. To assure the reliability of your products, all metals need to meet certain performance standards.

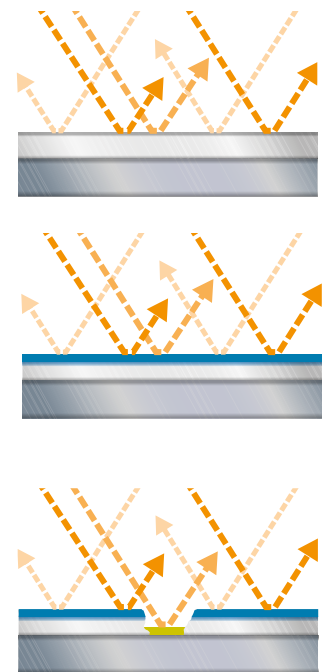
ISO 9224 specifies guiding values of corrosion attack for metals and alloys exposed to natural outdoor atmospheres for exposures greater than one year. The standard describes six corrosive environments ranging from very low (C1) to extreme (CX).

ISO 9223 establishes a classification system for the corrosivity of atmospheric environments.

Superior corrosion resistance

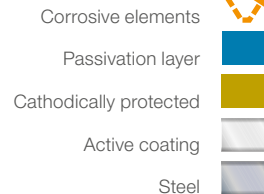
Bezinal[®] coated wires resist corrosion 2 to 6 times longer in heavily polluting corrosion tests* than hot-dip galvanized wires and last up to 8 times longer in heavily polluted areas**. This is thanks to the formation of the dense and high quality passivation layer that is mainly formed by aluminum oxides.

** Based on salt spray tests and Kesternich tests



Cathodic protection

Zinc-alloy coatings also offer cathodic protection of uncoated areas of the steel (e.g. cut-ends or scratches). The active coating generates an electrical current which reverses (counteracts) corrosive attack of the steel.



Whereas zinc is essential to create cathodic protection, adding magnesium to the coating, like in Bezinal[®] 3000, not only improves a process it also can make red rust disappear completely. The table below compares the cathodic and self-healing performance various types of coated wires.

Zinc	Bezinal [®]	Bezinal [®] 2000	Bezinal [®] 3000
Cathodic performance of 4 mm wire samples after three years of outdoor exposure			
Self-healing properties of 600 µm coating scratches after 3,5 months of outdoor exposure			

TRIED AND TESTED

To ensure the good quality and performance of our products, Bekaert constantly performs various standardized tests for product development or on the specific request of our customer. Bekaert performs corrosion tests from their own ISO 9001 certified laboratories and has them confirmed by various independent research facilities across the globe.

Standard tests include:

- Neutral salt spray test
- Kesternich test
- Heat resistance test
- Sea water tests
- Soil corrosion tests

For custom-made tests get in touch with your local Bekaert representative via our website www.bekaert.com.

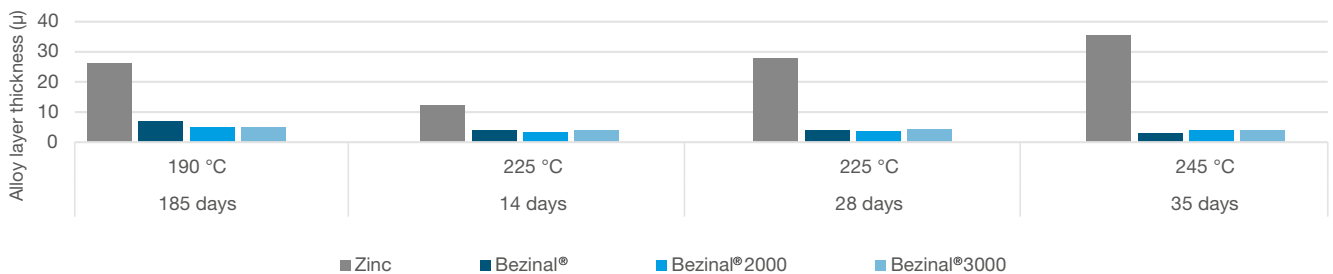


Heat resistance

Regular hot-dip galvanized (HDG) wires tend to experience alloy layer growth when exposed to higher temperatures. This alloy layer is the interface between the metallic coating and the steel wire. It generally contains the elements of the top coating combined with iron from the wire core. However, coatings of the Bezinal® range are immune to this phenomenon due to an inhibiting action of aluminum.

Unlike Zn-Al alloy coatings, regular zinc coatings are extremely hard. When this brittle alloy layer grows, the coating can lose adhesion especially when the wire is being bent. The following graph illustrates the alloy layer growth of HDG zinc at different exposure times and temperatures. Note the absence of alloy layer growth for the coatings of the Bezinal® family of coatings.

Intermetallic layer thickness after heat treatment starting from 3-6 µ initial alloy layer for different coatings



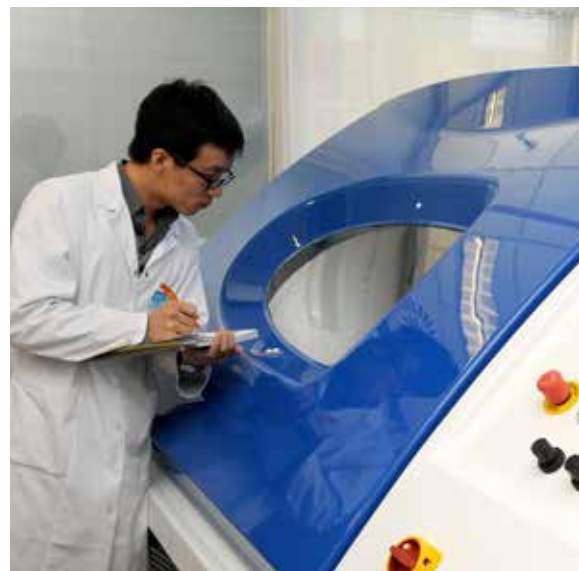
1-X wrapping of 1.85 mm wires for 185 days on 190°C



HDG Zinc



Bezinal® coated



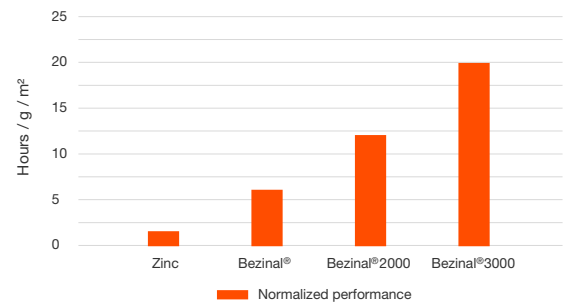
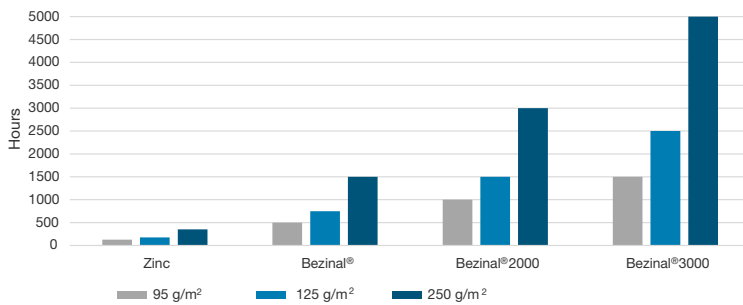
Neutral salt spray test

According to ISO 9227, ASTM B117

The salt spray method exposes various specimen, inside a cabinet, to a continuous spray of 5 % NaCl at a temperature of 35°C and relative humidity of 98%. The test measures the quality and performance consistency of metallic coatings.

When applied to the Bezinal® range, the classic Bezinal® coating outperforms zinc by approximately three times, Bezinal® 2000 roughly by six times and Bezinal® 3000 even up to ten times.

Salt Spray resistance till 5% dark brown rust for 2.5 mm coated wires



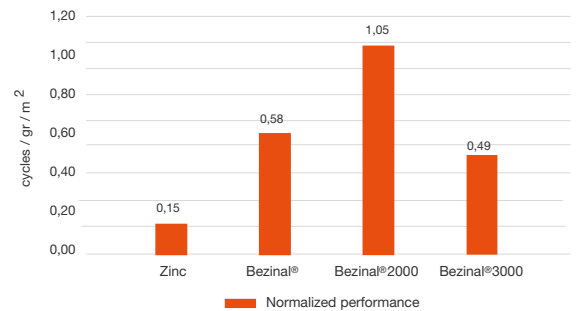
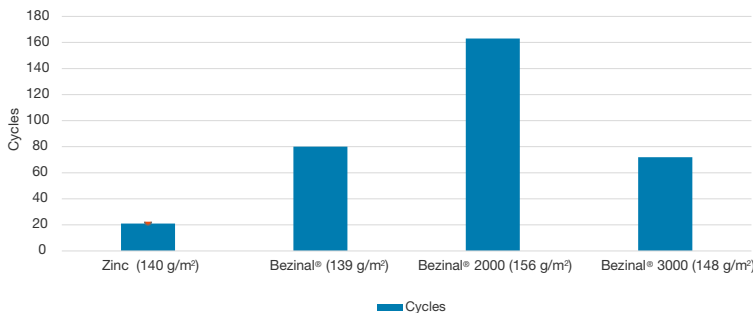
Kesternich test

According to ISO 6988:1985 and ASTM G87

During the Kesternich test, steel wire specimen experience a specific daily dose of acidic sulfur dioxide gas while inside a controlled cabinet. The tests simulate exposure to industrial pollution and volcanic activity.

The performance of the coating rises with its aluminum content. Bezinal® 2000 offers the best performance as it contains 10% aluminum, followed by Bezinal® and Bezinal® 3000 with a lower aluminum content. Pure zinc performs considerably poorer in polluted environments.

Kesternich performance till 5% dark brown rust of a series class B metallic coated redrawn wires



The example in the graph shows the normalized corrosion performance and consistency for various wire diameters and coating weights.



Your specialist in lifecycle extending coating solutions

Bekaert offers a wide range of active, passive or combined corrosion resistant coating solutions for any application and any environment.

By adjusting the surface properties of our materials, our steel wire products are more durable, easier to process and better looking.

This brochure focusses on active coatings and Bezinal® coatings in specific.

Contact us

More
Information?

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