



## GUIDE

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### **SuperExpanite®**

Ramén Valves introduces SuperExpanite®  
- the environmentally friendly surface hardening

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**Ramén Valves**

We know the flow

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Ramén Valves has a long history of innovation and excellence in the valve industry and as a step in our continuous efforts to achieve a more sustainable production process, we've made the environmentally friendly SuperExpanite® surface hardening our standard treatment for all our valves. This gas-based process produces no toxic waste and has the lowest carbon footprint in the industry.

Ramén Valves began testing the SuperExpanite® treatment in 2019 with excellent results. Since adopting Super Expanite® as our standard hardening treatment for all our valves, we've achieved significant milestones: minimizing our environmental footprint, extending the lifespan of our valves, and providing a solution that benefits both our customers and the planet.

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We have gathered all you need to know about SuperExpanite® in this guide. The guide is divided into two parts, where the first part answers questions such as:

**What is SuperExpanite®?**

**What problems does SuperExpanite® solve?**

**How will it affect my costs?**

**What applications is it suitable for?**

The second part will provide a highlight of all the advantages with SuperExpanite® such as:

**Improved corrosion resistance**

**Increased lifetime in abrasive applications**

**Less environmental impact**

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# **SuperExpanite®: An environmentally friendly and superior surface hardening solution for improved durability and cost-effectiveness**

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Ramén Valves has chosen SuperExpanite® as its new surface hardening treatment, as a step in its continuous efforts to achieve a more sustainable production process.

## **What is SuperExpanite®?**

The SuperExpanite® treatment was invented by the Danish company [Expanite](#), a surface hardening treatment provider that has revolutionized the industry with its new, sustainable surface hardening treatments.

SuperExpanite® combines a high-temperature vacuum solution-nitriding process and a low-temperature atmospheric nitrocarburizing process. The result is a surface layer that is up to 10 times harder than the original material and also resistant to corrosion and wear.

## **What problems does SuperExpanite® solve?**

One of the main advantages with SuperExpanite® is that it eliminates the need for hard chroming, which is now banned in Europe due to its toxic chemicals and its harmful environmental impact.



The SuperExpanite® treatment provides at least the same hardness level as hard chroming, but eliminates the need of dangerous chemicals, making the process more environmentally friendly.

Expanite also solves the problem of parts wearing out too quickly due to exposure to abrasive media. The SuperExpanite® treatment increases the hardness of the parts in contact with abrasive particles without altering the corrosive resistance of the base material. This means that parts can withstand exposure to abrasive and corrosive media for longer periods, increasing their lifespan and reducing maintenance costs.

Moreover, the SuperExpanite® treatment can be used on different parts of the valves which previously were not commonly treated by hard chroming. This leads to possibilities in very harsh environments where SuperExpanite® treatment could be a better solution than hard chroming. Additionally, SuperExpanite® can be used in applications where hard chroming was not compatible with the media.

## How will it affect my costs?

Ramén Valves' products that were previously provided with hard chroming are now instead treated with SuperExpanite®. This provides customers with a comparable, or even better, level of hardness and better corrosion resistance, without the use of toxic chemicals. The price will be unaffected by this change but since the durability will be improved for many abrasive and corrosive applications it will in fact lower the product's total life cycle cost.

## What applications is it suitable for?

The SuperExpanite® treatment is suitable for various applications, particularly in industries where parts are in contact with abrasive media, such as valves used in slurries, wastewater, and fiber suspensions. The treatment can be used in a wide range of industries, including pulp and paper, steel, mining, chemical, food and energy.







# Why choose SuperExpanite® over hard chroming in valves?

## A highlight of all the advantages

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Ramén Valves reinforces its commitment to achieve a more sustainable production process, by adopting the more environmentally friendly SuperExpanite® treatment as its standard surface hardening, replacing hard chroming.

By embracing SuperExpanite®, Ramén Valves aims to provide its customers with superior, long-lasting, and environmentally responsible valve solutions for diverse industrial applications. This decision stems from SuperExpanite's® numerous advantages over hard chroming, including wear resistance, galling resistance, environmental sustainability, and corrosion resistance.

Here we will highlight the numerous advantages of SuperExpanite® and explain why Ramén Valves has chosen to adopt this innovative surface treatment.

### Ideal for abrasive media thanks to increased hardness

Hard chromed coatings typically have a hardness of HV\* 900-1,000, while SuperExpanite® achieves HV 1,200±100 (usually in the range of 1100-1200). The increased hardness of Ramén Valves' products treated with SuperExpanite® will therefore give the products a better wear resistance, making them ideal for applications involving abrasive materials.

\*The Vickers hardness test is a method to measure the hardness of materials. The basic principle, as with all common measures of hardness, is to observe a material's ability to resist plastic deformation from a standard source. The unit of hardness given by the test is known as the Vickers Pyramid Number (HV).

## Better Galling Resistance

The SuperExpanite® treatment as well as hard chroming result in good resistance to galling. However, the inherent cracks in hard chromed coatings can initiate scuffing of the partnering surface, which may result in galling. The SuperExpanite® hardened surface is however crack free, thus offering an improved galling resistance in comparison.

## A wider range of applications

The SuperExpanite® treatment does not negatively affect the corrosion resistance of the base material, it can even enhance the corrosion resistance of stainless steel 316L. Hard chroming, on the other hand creates a layer on the base material that can be incompatible with certain media, due to corrosion. For instance, hard chromed coatings are not compatible with sulfuric acid and phosphoric acid. While stainless steel 316L or 254SMO treated with SuperExpanite®, that Ramón Valves provides as standard, can be used depending on the concentration, content and temperature. This means Ramón Valves solutions with SuperExpanite® treatment can be used in applications where the use of hard chroming would be prohibited.

## Increased lifetime in abrasive applications

SuperExpanite® can be utilized in Ramón Valves components that traditionally were not treated by hard chroming, for example the body. With the increased hardness that SuperExpanite® brings, this results in an increased lifetime when valves are used in very abrasive applications.





## Hardened surface layer thickness

Hard chromed coatings are foreign layers formed on top of the base material surface, making them prone to flaking, cracking, and delamination. The SuperExpanite® processes, on the other hand are diffusion processes, creating a hardened case based on the base material alloy, without the risk of cracking, flaking, or delamination. The SuperExpanite® treatment results in a hardened surface layer of typically 20µm. While it is possible to produce thicker hard chrome coatings, this often leads to more post-grinding due to the pronounced edge effect of hard chrome.

## Less environmental impact

From a sustainability point of view, the SuperExpanite® process is more environmentally friendly compared to hard chroming, and the lifetime of the valves is increased.

The SuperExpanite® processes neither depletes natural/geological resources nor produce polluted wastewater. It also boasts a low energy consumption of 1.9 kWh/kg. Conversely, hard chroming is a low-efficiency process, wasting at least 70% of electric energy. Hard chroming also involves the use of harmful chemicals such as chromic acid, sulfuric acid, lead, lead chromate, and lead oxide whereas SuperExpanite® uses no harmful chemicals at all.

## Description of the SuperExpanite® process

SuperExpanite® combines two processes. The vacuum solution-nitriding process involves heating a part in a vacuum chamber to a temperature of 1000-1200°C. Nitrogen is then introduced into the chamber, and the part absorbs it. The nitrogen diffuses into the material, increasing the core hardness of the part and creating a unique load-bearing capacity. This process secures corrosion resistance, making the part more durable.

The atmospheric nitrocarburizing process involves heating the part in an atmospheric environment to a temperature of 380-470°C. This process establishes a double hardened zone containing nitrogen and carbon, where nitrogen adds increased surface hardness while carbon bridges the gap to the softer core. The result is a surface that is extremely hard and resistant to wear.



## About Ramón Valves

Ramén Valves is a leading manufacturer of industrial valves for the process industry, including pulp and paper, power generation, mining, and chemical processing. With a focus on innovation, quality, and sustainability, Ramón Valves has established itself as a trusted partner for its customers worldwide.

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