

**ARMOX<sup>®</sup>**  
PROTECTION PLATE

# PRO TEC TION

A close-up photograph of a bullet hole in a blue, textured surface, likely a piece of armor. The bullet is visible as a dark, cylindrical object protruding from the hole, with a white, splattered impact area around it. The background is a deep blue with a fine, grainy texture.

Armor steel for the  
threats you can't ignore

**SSAB**



## On the safe side

It goes without saying. If you are the supplier of a steel plate that could be the only thing standing between a human being, and a bullet travelling towards its target – you better be on the safe side.

That is how we go about it, and that has been our approach since the very first day we entered the market for protection plates.

To stay on the safe side, we have to stretch the limits of what is possible. To go far beyond specifications and today's threat levels. We have to think differently, be innovative and take full advantage of SSAB's 50 years of experience, research and knowledge within niche steel production.

This approach has made it possible to develop harder and tougher steel than anyone else, and to offer you the markets most comprehensive product range. We are your competitive advantage for your future designs of protective equipment.

We decided to stay on the safe side. We think you should too.



# 50 years of research and a continuous ambition of pushing the boundaries.

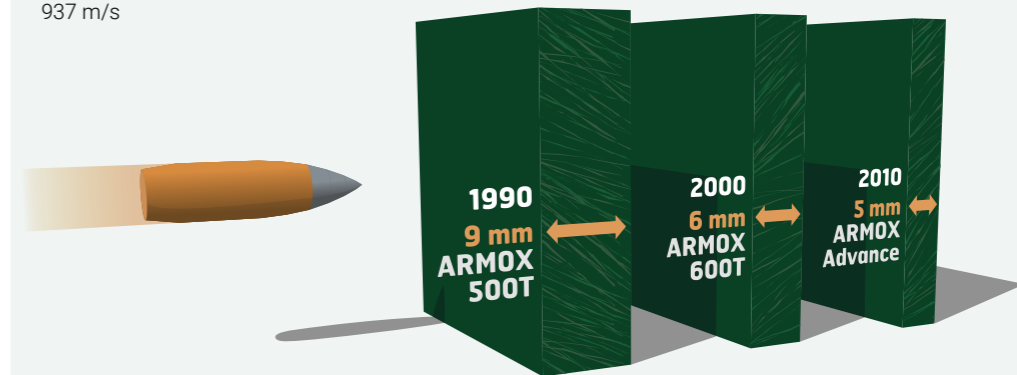
Armox® was born and raised for one single purpose – to protect human life. We do that by providing the world's leading manufacturers of protection equipment with even more sophisticated protection steel grades specially developed for being the top-of-the-line choice for protection solutions. The pedigree is unique; SSAB is a world leader in quenched and tempered steel, through 50 years of technological leadership.

There is no single secret recipe for how to produce the world's most advanced protection plate, there are many. It all starts with the careful selection of raw materials. From there we master every step of the production process: the steel making, the secondary metallurgy, the continuous casting, the slab reheating, the rolling, the quenching and the tempering.

Our understanding of exactly how each step affects the properties of the steel, the desire to continuously find new ways to refine the process, and the ability to fully control the complete process is how Armox® can offer you the superior range of protection steel.

Pure steel.  
Pure Evolution.

THREAT  
Projectile:  
5.56 M193/SS92  
Velocity:  
937 m/s



25 years of unparalleled product development, has made it possible to offer the market a protection plate that provides the same level of protection at half the plate thickness. This makes it possible to save 50 percent on weight, without compromising on safety. No one, can keep pace with our evolution.



# Only by understanding tomorrow's threat levels, we help our customers protect human lives.

When people with diverse expertise come together, evolution takes a major step forward and new knowledge arises. This happens when a metallurgist meets a vehicle designer and it happens when our ballistic experts are discussing future needs of armored clothing with a group of fabric manufacturers.

Over decades, we as a leading supplier of protection plates, have been involved in thousands of designs of protection equipment. Each time we enter a new project this interactive process creates new ideas and solutions come alive. This is how we improve ourselves, this is how we bring crucial knowledge into our projects.



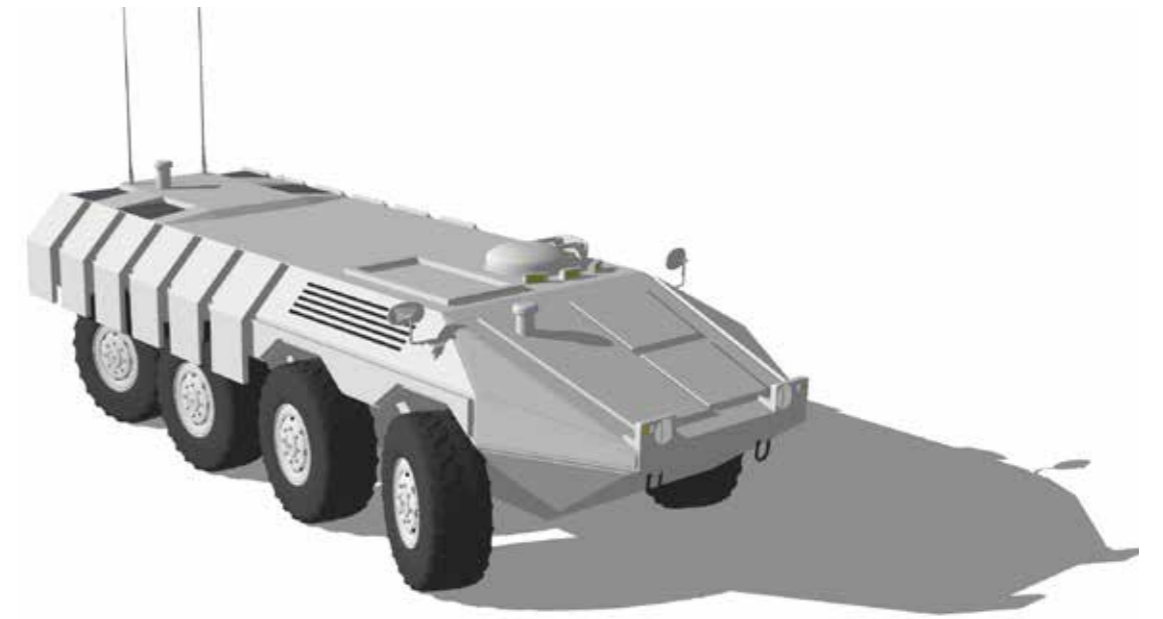
## PATROL VEHICLE

Used for homeland security missions. Policing operations. It has to look friendly and discrete, but still offer a certain level of protection, without compromising performance and fuel efficiency.



## CASH IN TRANSIT VEHICLE (CIT)

The safe delivery of cash and valuables is constantly evolving as robbers and attackers become more sophisticated. These vehicles need to have the capability to protect both their cargo and their personnel with a minimum additional weight penalty.



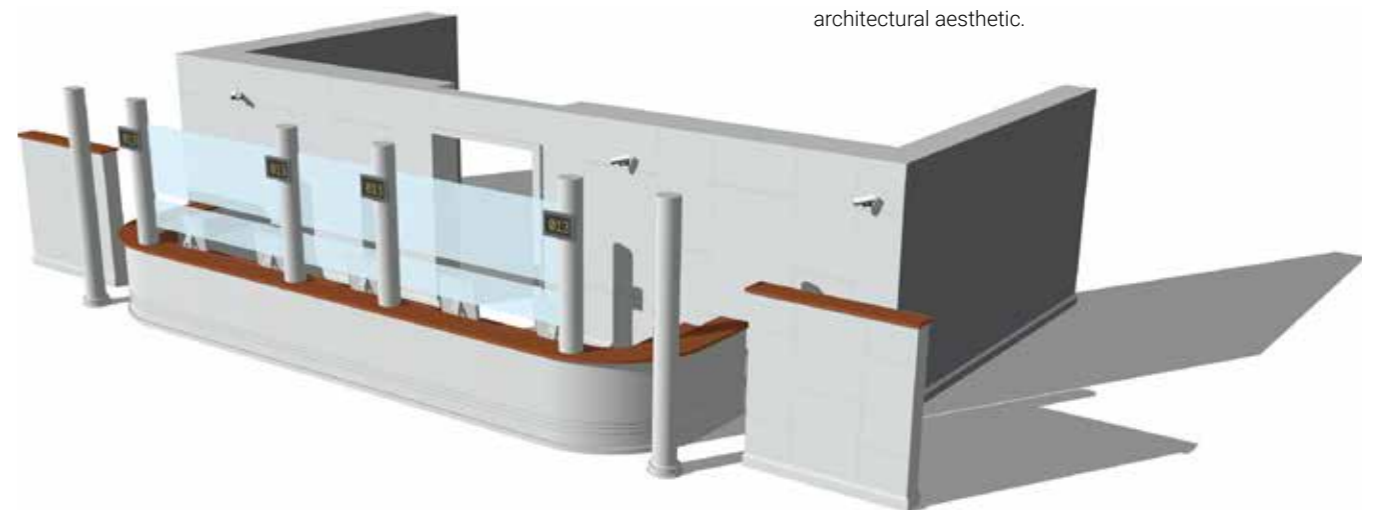
## 8 X 8 ARMORED PERSONNEL CARRIER (APC)

It needs to be fully protected all around from threats such as: airborne missiles, IEDs and standard ballistic threats. Whilst remaining as light as possible and being covered with innovative survivability technology and solutions.



## 4 X 4 ARMORED PERSONNEL CARRIER (APC)

Vehicles of this type are suitable for armored patrol, surveillance and reconnaissance. The design has to include complete ballistic and mine protection technologies, whilst still maintaining good on- and off-road capabilities.



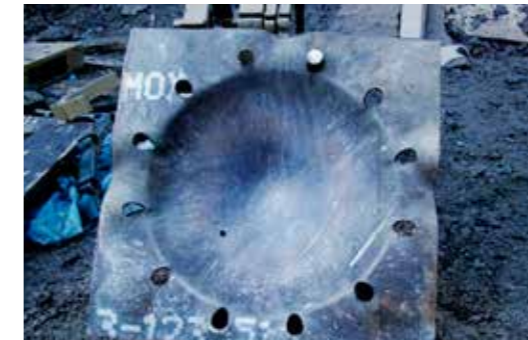
## PROTECTED BUILDINGS

Armox® steel is used in various architectural applications. Including government buildings, financial institutes, private homes and any location where a cash transaction takes place. The challenge is achieving the right protection level, without interfering with the building's functionality or its architectural aesthetic.

# There is a reason why our product range doesn't only include the hardest steel in the world. You.

No matter if your task is to build an armored military transport vehicle, a VIP limousine or a panic room. Every application, every design has its own challenges and unique set of critical design requirements.

Armox® is offering the markets most comprehensive product range. This way you should always find the optimal grade and dimensions for your application, whether it is hardness, toughness, total weight requirements or the workshop properties which is your major challenge. Armox® also offers tailor-made plate dimensions when you need to go outside the standard stock dimensions. Regardless of your choice, you will always benefit from Armox®'s higher toughness and superior thickness precision.



**ARMOX® 440T** has the highest toughness in our range. Its superior toughness makes this steel a common choice for applications with high requirements on blast protection. The cleanliness and chemical composition of the steel also makes it easy to process, including excellent properties for welding and bending.



**ARMOX® ADVANCE** is the hardest steel in the market - it is so hard it seriously challenges ballistic properties of ceramic plates. But it still offers all the advantages of steel, including the toughness required to withstand multi-hits and still possess good workshop properties to simplify your design and production process.



Armox® product range	Thickness (mm)	Typical Hardness (HBW/HRC)	Typical Yield Strength (MPa)	Typical Tensile strength (MPa)	Typical Impact toughness at -40 C (J)*
Armox® 370T Class 1	3.0-19.9	405	1200	1300	35
	20.0-39.9	360	1040	1125	55
	40.0-100.0	325	935	1040	80
Armox® 370T Class 2	3.0-152.0	310	880	950	100
Armox® 440T	4.0-80.0	450	1200	1425	75
Armox® 500T	3.0-130.0	515	1350	1690	45
Armox® 520T	4.0-12.0	520	1400	1725	40
Armox® 560T	4.0-15.0	555	1545	1880	30
Armox® 600T	4.0-20.0	605	1540	2100	25
Armox® 620T	5.0-15.0	57			20
Armox® Advance	4.0-7.9	60			13

\*Transverse to rolling direction. Charpy-V at -40°C. 10x10 mm test specimen, except for Armox Advance where a 5x10 mm test specimen is used. For more information, see datasheets at [www.armoxplate.com](http://www.armoxplate.com)

# When providing equipment for the protection of human lives, you better be on the safe side. We are.

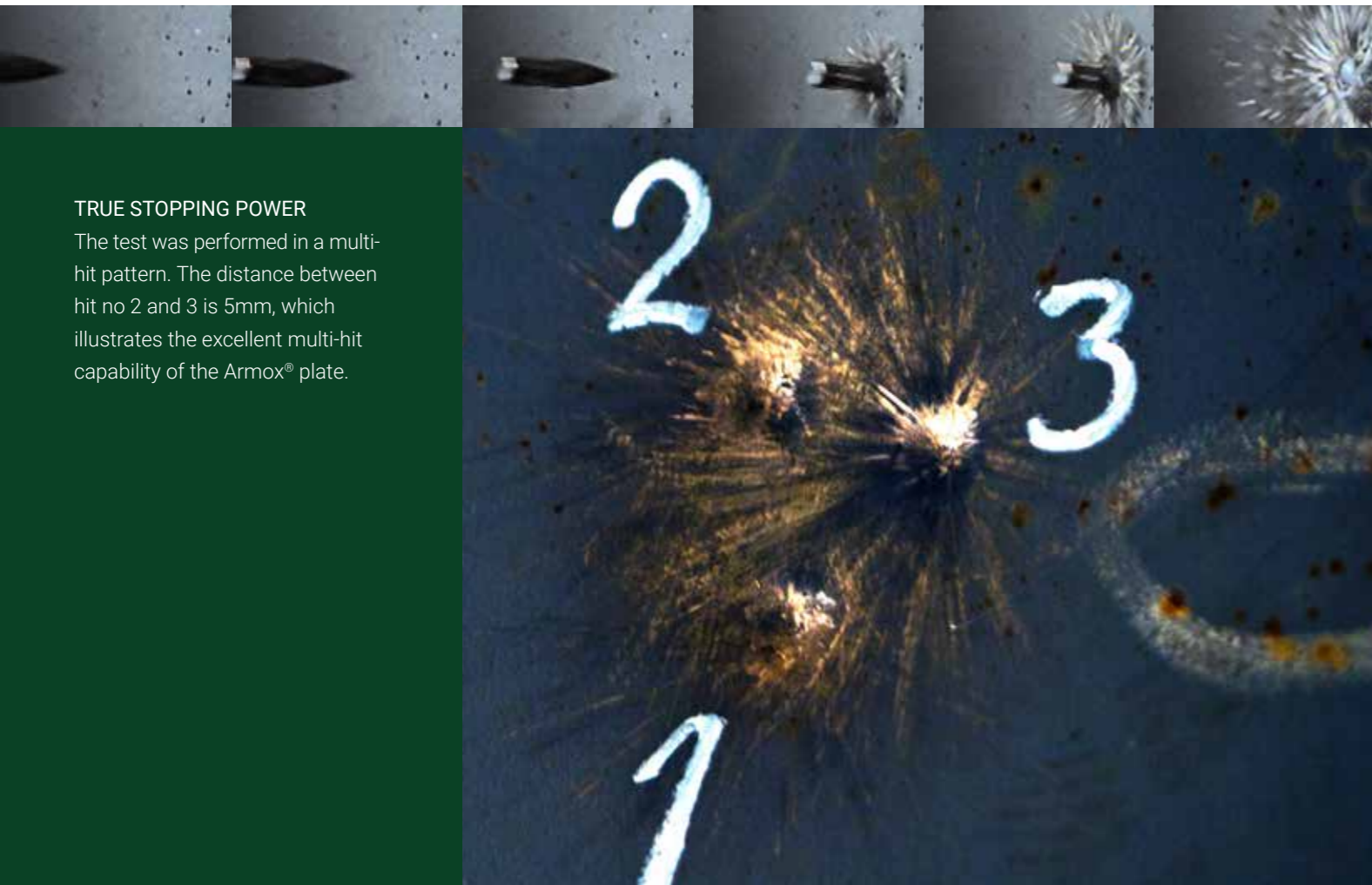
Armox® protection plates have been used to protect people in the world's most dangerous environments for more than 40 years. It has literally been tested in the field.

Our customers are suppliers of protection equipment for military and civil applications; equipment that can ultimately save human lives. Under such circumstances, there is no room for mistakes. Our entire production process is designed to make sure our products are always well within the specifications, to ensure you are always on the safe side.

That's why Armox® protection plates can be delivered with guaranteed ballistic properties. Each grade and thickness is tested according to the most extensive and stringent international standards. In addition we cooperate with leading independent laboratories for ballistic testing in order to offer protection plates, certified according to your required standards.

# Suggested plate thickness start values for further protection design.

The suggested plate thickness start values are based on ballistic testing of Armox® grades carried out at room temperature by third-party bodies. SSAB shall not in any way be held liable for the suggested plate thickness and how they are interpreted, used, relied on, applied or likewise\*.



## TRUE STOPPING POWER

The test was performed in a multi-hit pattern. The distance between hit no 2 and 3 is 5mm, which illustrates the excellent multi-hit capability of the Armox® plate.

STANAG 4569									
Protection level	Threat	Velocity (m/s)	Range (m)	Armox 500T (mm)	Armox 520T (mm)	Armox 560T (mm)	Armox 600T (mm)	Armox 620T (mm)	Armox Advance (mm)
Level 1	5,56x45 SS109	900±20	30	9,0	8,5	8,0	6,0	5,0	5,0
	5,56x45 M193	937±20							
	7,62x51 Ball	833±20							
Level 2	7,62x39 API BZ	695±20	30	12,0	12,0	10,5	8,5	8,0	8,0
EN 1522									
Protection level	Threat	Velocity (m/s)	Range (m)	Armox 500T (mm)	Armox 520T (mm)	Armox 560T (mm)	Armox 600T (mm)	Armox 620T (mm)	Armox Advance (mm)
FB4	.357 Mag FJ/CB/SC	430±10	5	3,0	-	-	-	-	-
	.44 Mag FJ/FN/SC	440±10							
FB4+	7.62x39 M43	700±10	10	4,0	4,0	-	-	-	-
FB5	5,56x45 SS109	950±10	10	6,5	6,5	6,0	5,0	5,0	4,5
FB6	5,56x45 SS109	950±10	10	6,5	6,5	6,0	5,0	5,0	5,0
	7,62x51 NATO Ball	830±10							
FB7	7,62x51 NATO AP	820±10	10	14,0	14,0	12,5	11,0	10,5	9,0
VPAM PM 2007									
Protection level	Threat	Velocity (m/s)	Range (m)	Armox 500T (mm)	Armox 520T (mm)	Armox 560T (mm)	Armox 600T (mm)	Armox 620T (mm)	Armox Advance (mm)
PM4	.357 Mag FJ/CB/SC	430±10	5	3,0	-	-	-	-	-
	.44 Mag FJ/FN/SC	440±10							
PM6	7.62x39 M43	720±10	10	4,0	4,0	-	-	-	-
PM7	5,56x45 SS109	950±10	10	6,5	6,5	6,0	5,0	5,0	5,0
	7,62x51 NATO Ball	830±10							
PM9	7,62x51 NATO AP	820±10	10	14,0	14,0	12,5	11,0	10,5	9,0

\* For the avoidance of doubt, each customer is responsible for, including but not limited to, carrying out verifications of requested plate thickness, determining the appropriateness of e.g. drawing conclusions based on the suggested plate thickness, and assess any potential risks associated with it.

# Hard steel, easy processing – that used to be a contradiction.

It's one thing to develop the world's hardest steel and to ensure its ballistic properties, it's another to make the same steel easy to process in the workshop. We did both.

Being able to offer a protection plate that combines these characteristics has been a design criterion for the development of Armox®.

SSAB is not only a leader within protection steel; we are also a global supplier of high strength steel and wear plates. By taking full advantage of the collective knowledge and expertise within our group we have been able to ensure Armox® has the properties you need. Not only to produce and maintain your application efficiently, but also to enable new design solutions that could further enhance the protection of human lives.



## CLEANLINESS

Our steels are cleaner than most other steels. The low carbon content makes them easier to weld and with the use of electrodes with low hydrogen content is the risk of cold cracking minimized.



## A BIT TOUGHER

Armox® protection grades always offer a high toughness relative to their hardness. This gives our steel good bending properties. High thickness precision in combination with uniform properties ensures superior repeatability.



## FITS RIGHT AWAY

Thanks to our fine tuned production, we deliver plate having similar properties independently of when being produced. This means you will have less downtime in your production since the settings you once tried out will work also for coming plate batches for process.



## REALITY

Our products are often used in applications where there is no access to advanced workshops. This is a factor we always take into account in the development.

# A controlled process – all the way from our careful selection of raw material to your production line.

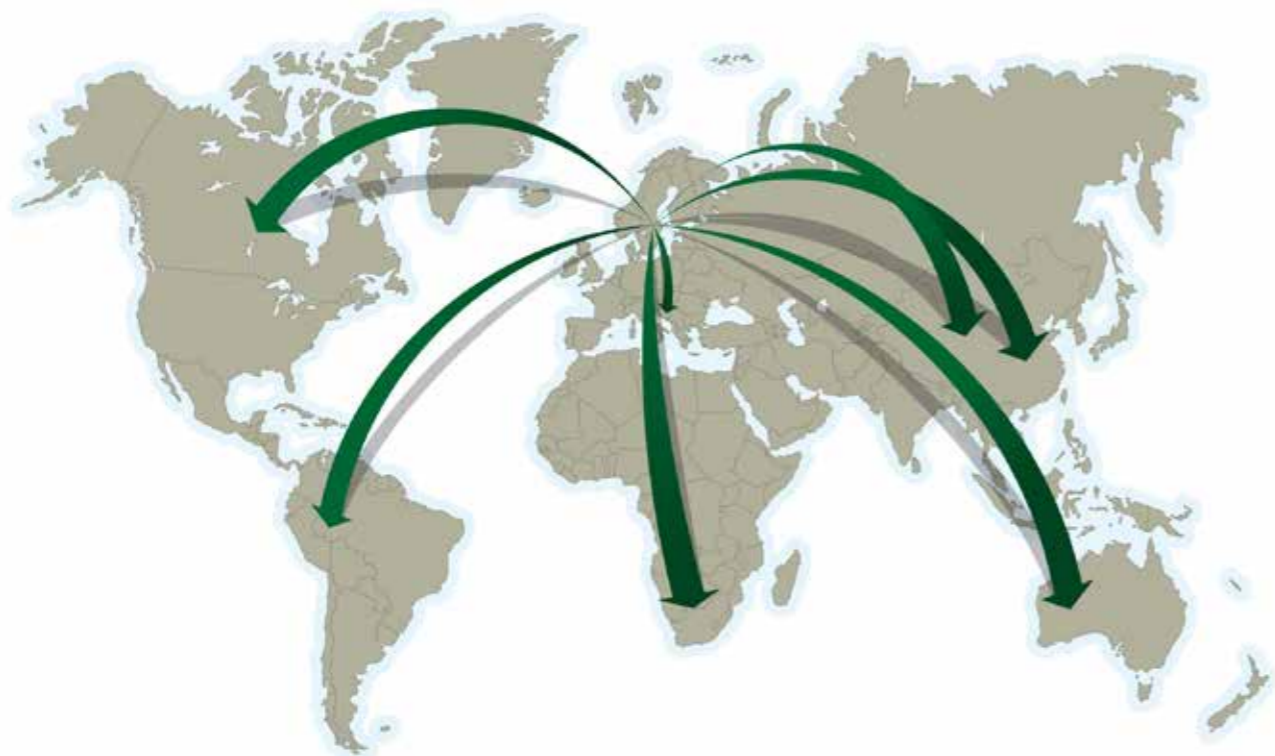
Steel from Sweden has become well known for its superior quality, consistency and reliability. And this is no coincidence. We have been around for over 50 years. Every year we produce millions of tonnes of high quality steel and every day we focus on making our products even better, to ensure we maintain our status as the technical leader for the next 50 years as well.

When you partner with us, you get the knowledge and resources of a world leading producer. You will benefit from our expertise throughout the design process all the way to the production and application. We will be at your side - from the evaluation and selection of grades and thickness, the optimization of your production process all the way from the tracking of your delivery to your production site.

The service and support, which comes as standard with our products, doesn't make our steel harder, but will make the journey to achieve your objectives much easier.



From our fully integrated mill in Oxelösund we cater  
the world's need for high quality protection steel





SSAB is a Nordic and US-based steel company. SSAB offers value added products and services developed in close cooperation with its customers to create a stronger, lighter and more sustainable world. SSAB has employees in over 50 countries. SSAB has production facilities in Sweden, Finland and the US. SSAB is listed on Nasdaq Stockholm and has a secondary listing on Nasdaq Helsinki. [www.ssab.com](http://www.ssab.com)

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