

DOMEX®

DOCOL®

Wear resistant steels

DOMEX®

Domex Wear

DOCOL®

Docol Wear 450

SSAB
SWEDISH STEEL



Falu Mine, Stora Kopparberget and "Old Grandma" are some of the many names used for this historic site. The mine collapsed in 1687, and the Stora Stöten opencast mine was then opened. The collapse luckily occurred on Midsummer Day – one of the few vacation days in the year – and there were no fatalities.

Domex Wear and Docol Wear 450 steels can be used to extend the useful life of most utility products that are subjected to wear. So you can now embark on making products that would otherwise have failed on durability or economic grounds.

Our wear resistant steels enable you to eliminate the hardening process from your production chain, which will cut the costs of handling and heating, improve efficiency and shorten the lead times.

The steels have good resistance to wear and high strength, while also being formable and easy to weld.

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Outline of wear resistant steels

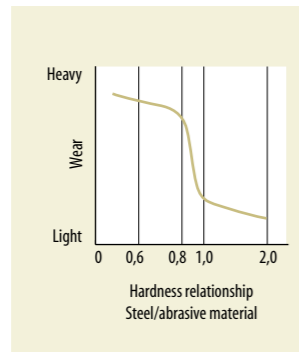
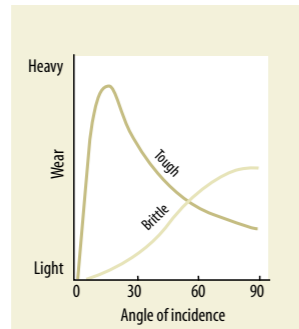


Figure 1.



Angle of incidence:

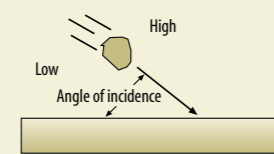


Figure 2.

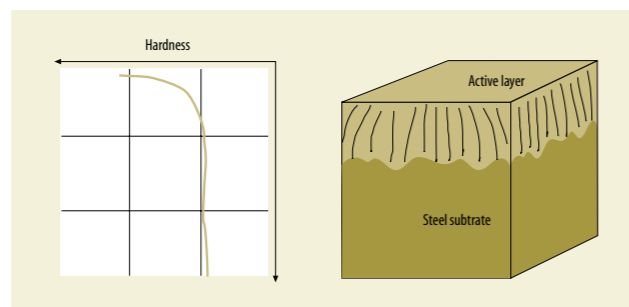


Figure 3.

When a hard particle or hard surface irregularity causes a scratch or removes material from the surface of a steel, it is the hardness and toughness of the steel that determine the extent of the damage to the surface.

Hardness

Steels with high hardness are usually more wear resistant than mild steels. The relationship between the hardness of the steel and that of the abrading material determines the effect to an even greater extent. Wear changes from light to heavy when the abrading material is as hard as or harder than the steel (Figure 1).

Toughness

Toughness is important when the steel is subjected to impact. A tough steel will sustain less wear at high angles of incidence, whereas a hard material will sustain less wear at low angles (Figure 2).

Active wear layer

The process of wear on a steel may give rise to a heavily deformed surface layer that has very different properties from those of the substrate material. This "active layer" determines the wear resistance to a greater extent than the bulk hardness of the material. This is the reason why certain steel grades with low bulk hardness have a wear resistance that is higher than expected (Figure 3).

Field testing

Field testing is the best way of determining the wear resistance of a steel. But the procedure is time-consuming, involved and costly.

We run our tests at a rock crusher in Borlänge, where we subject 500 x 500 mm steel specimens to wear by a flow of gravel. Every test is run for two weeks, and the steel is subjected to wear by 10 000 tonnes of gravel.

Laboratory testing

Whenever we test steels in our laboratory, we do our best to make them as realistic as possible. We therefore run our tests in a paddle machine in which a cylindrical drum rotates around a horizontal shaft. A round disc rotates inside the drum at a higher speed than the drum itself, and the test piece is mounted on the disc so that it projects like a paddle. The paddle rotates and is abraded against small granite pebbles inside the drum.



Wear

Wear is a phenomenon that occurs all around us. Whenever something wears, material is worn away from the point of contact between two bodies. In most cases, wear can be attributed to one of four variants:

- adhesion
- abrasion
- surface fatigue
- oxidation/corrosion

Out of these variants, it is

principally abrasion that takes place in steel sheet applications. For perceptible abrasive wear to take place, the abrasive material must be about 20 percent harder than the material being worn. But steel can be worn even by soft materials. It is then a mixture of abrasion, surface fatigue and wear corrosion that takes place.

Abrasion is the form of wear to which sheet steel is usually subjected. Truck bodies, tipper truck bodies,

concrete mixers and digger buckets are subjected to continual abrasive wear.

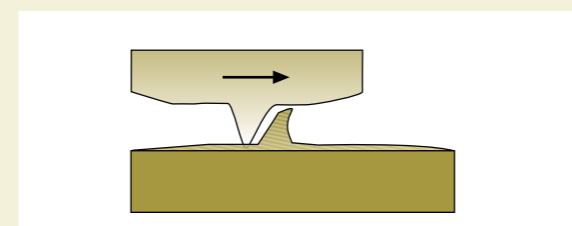
Sliding abrasive wear

When a hard particle or surface irregularity penetrates the surface of a softer material and slides along it, abrasive wear will occur. The worn material is then scratched or chips are removed from it.

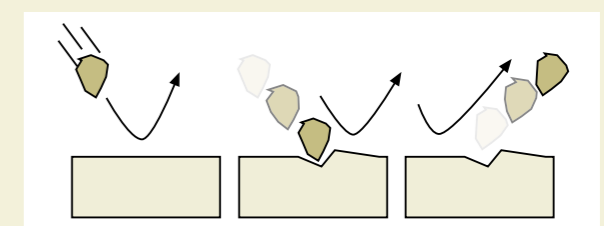
Abrasive impact wear

When hard objects or particles strike a softer material, they

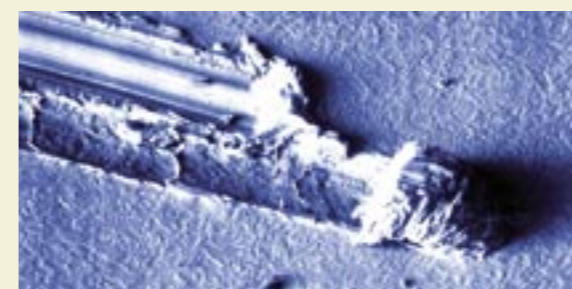
will deform the surface or cut out chips before bouncing off. If the particles are relatively small, such as sand or dust, the wear is known as erosion.



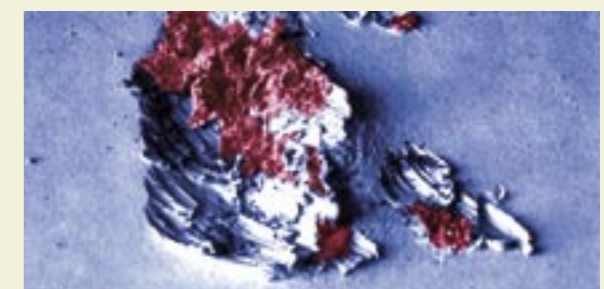
Sliding abrasive wear.



Abrasive impact wear.



Sliding abrasive wear.



Abrasive impact wear.

Product range

Welding

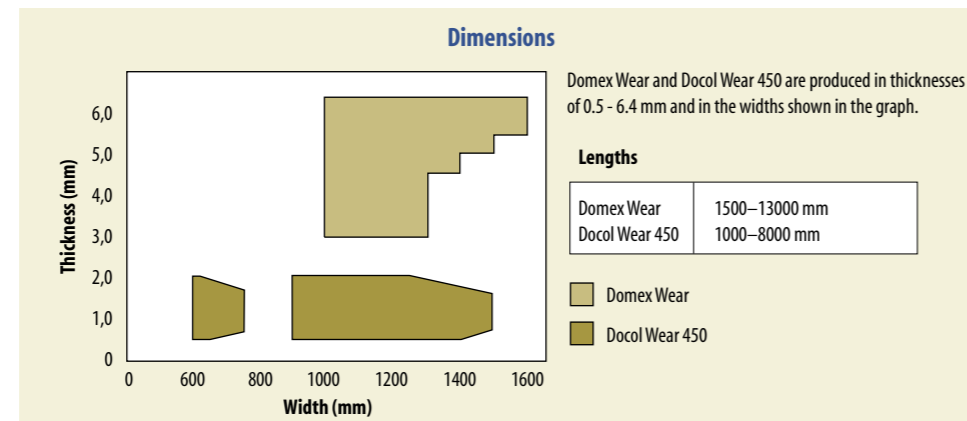
Domex Wear and Docol Wear 450 have good weldability. All conventional methods of welding can be used.

For information concerning recommended welding electrodes, see separate datasheets, GB 326 and GB 439.



Impact strength

The impact strength of Domex Wear on a longitudinal test piece is at least 34 J/cm² at -20°C.

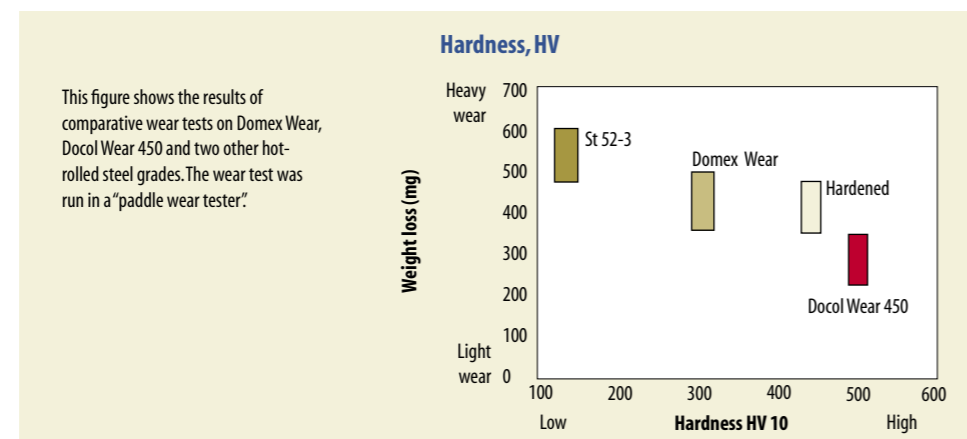


Physical properties

| Product | Yield strength N/mm ² typical | Tensile strength N/mm ² | | Elongation A ₅ % A ₈₀ % | | Brinell HB typical | Hardness Rockwell HRC typical | Vickers HV 5 typical |
|----------------|--|---------------------------------------|---------|--|-----|-----------------------|-------------------------------------|-------------------------|
| | | min | typical | typical | min | | | |
| Domex Wear | 790 | 850 | 950 | 15 | | 285 | | |
| Docol Wear 450 | 1150 | 1400 | | | 3 | 440 | 43 | 456 |

Bending

| Sheet can be bent in all directions to the following minimum bending radii Min. bending radius for 90° bend | |
|---|---------------------|
| Domex Wear | 2 x sheet thickness |
| Docol Wear 450 | 4 x sheet thickness |



Our knowledge will boost your competitiveness

Our customer service engineers are always at your service. They have extensive experience of materials, machining and production. Their broad perspective will assist you in using modern materials technology for boosting your competitiveness. In addition, our experts in application engineering can assist you with their spearhead knowledge in the fields of sizing, forming, joining and wear.

Our courses and seminars

We run courses that provide fundamental knowledge of steel. We also offer various

seminars that will give you in-depth knowledge of sizing, design, working and joining.

In addition, we would be pleased to tailor courses to suit the specific needs of your company.

Handbooks and product information

If you want to gain in-depth knowledge of modern materials technology and the opportunities it offers, you should requisition our handbooks.

The Sheet Steel Handbook is packed with information on sizing and design, and also offers a wide range of production engineering advice.



The Sheet Steel Forming

Handbook gives details of plastic forming and machining.

If you then need further insight into our steels and additional knowledge, we shall be pleased to send you our product information materials.

If there is anything further you wish to know, visit us at www.ssabtunnplat.com.



SSAB Tunnpåt AB is the largest Scandinavian sheet steel manufacturer and a leader in Europe in the development of high strength, extra-high strength and ultra-high strength steels.

SSAB Tunnpåt is a member of the SSAB Swedish Steel Group, has a turnover of SEK 10 billion, and has around 4400 employees in Sweden. The company produces around 2.8 million tonnes of sheet steel annually.

Our environmental policy involves continual improvements to the efficiency of our production processes and environmental care plants, and development of the environmental properties of our products from the life cycle perspective.

We produce the following steels in our modern, high-efficiency production lines and rolling mills for strip products:

DOMEX
hot-rolled steel sheet

DOCOL
cold-reduced steel sheet

DOGAL
metal-coated steel sheet

PRELAQ
prepainted steel sheet

We assist our customers in selecting the steels that are best suited for improving their competitiveness. Our strength lies in the quality of our products, our reliability of supply, and our flexible technical customer service.

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