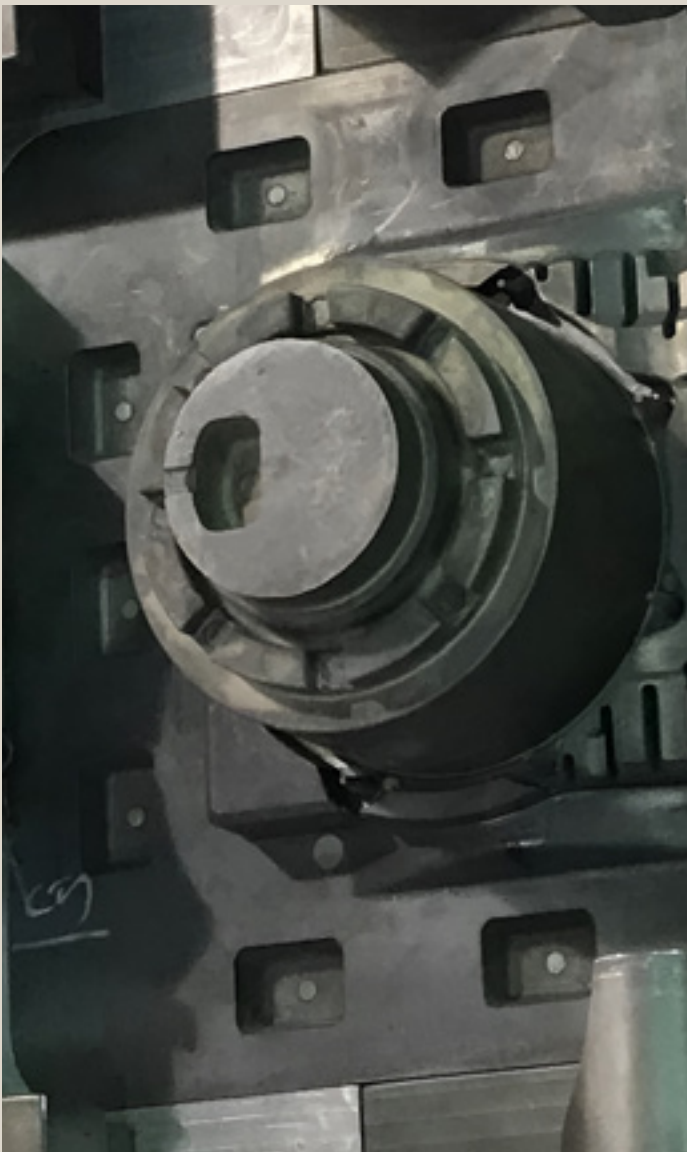


# Toolox<sup>®</sup> 46

outperforms  
in high-temperature



die casting,  
extrusion,  
forging and  
hot stamping  
applications

## Experience precision and endurance also at higher temperatures

Designed for high-temperature performance, Toolox® 46 engineering & tool steel can operate continuously up to its temperature limit of 600 °C. It maintains its original hardness even after cooling to room temperature.

**Toolox® 46 is ideal for aluminium extrusion dies, high pressure die casting, hot forging, wear parts working at high temperatures, and other steel parts exposed to heat.**

## A cost-effective alternative to ESR steels

Toolox® 46 performs on par with or even surpass ESR hot work tool steels in forging and extrusion die applications. With its superior heat resistance, Toolox® 46 offers a more cost-effective solution without compromising performance.

## Cutting-edge machinability

Toolox® 46 is delivered prehardened with carefully controlled properties. It has a low-carbon, low-carbide composition for easy machining with normal carbide tools. The steel is practically free from internal stresses, allowing you to achieve precise dimensions without stress-relieving during processing.

## Time to save

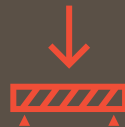
Toolox® 46 is produced with a hardness of 46 HRC all through the material. This eliminates the need for further quenching and tempering and subsequent adjustments to reach the correct dimensions.

**You can save days and potentially weeks in production time compared to a conventional steel.**



## Toolox® steels come with properties above standard

Toolox® 46 is extensively tested before delivery. All individual products undergo ultrasonic testing to demands above international standard. Mechanical testing is performed on the heat treated product and the values found are transferred to the product certificate.



Hardness and toughness



Machinability

## Heat treatment risks disappear

Since Toolox® 46 is already prehardened to the proper hardness, this eliminates the risk that always comes in connection with external heat treatment.



Surface condition



Thickness



## From hard to harder

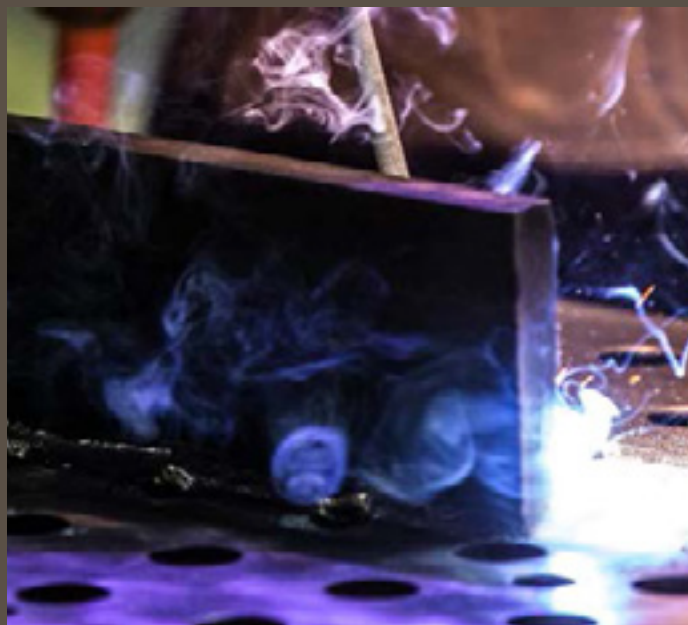
The hardness, toughness and uniform microstructure makes Toolox® 46 a perfect substrate for surface treatment. It is delivered prehardened to 46 HRc. If necessary, the surface hardness can be increased by nitriding, PVD or other surface treatments. The nitriding performance is superior to standard steels, a result of the low carbon and alloy composition.

| Steel      | Surface hardness (HV) | Core hardness (HV) | Nitriding layer thickness (µm) |
|------------|-----------------------|--------------------|--------------------------------|
| Toolox® 46 | 900                   | 440                | 175                            |
| DIN 1.2344 | 950                   | 535                | 70                             |

Nitrocarburization at 565 °C, 4 h holding time, process gases NH<sub>3</sub> and 5% CO<sub>2</sub> with pre-oxidation applied.

## Maintenance made easier

The low carbon and alloy content of Toolox® 46 make welding repair and modifications much easier. The preheating and special electrodes normally used can in many cases be avoided, allowing for a much more efficient and less costly procedure.





| Properties                                              | Toolox® 46 plate                                                                         | Toolox® 46 forged block       | Toolox® 46 round bar    |
|---------------------------------------------------------|------------------------------------------------------------------------------------------|-------------------------------|-------------------------|
| Thickness/Diameter (mm)                                 | 60.0-130.0                                                                               | 170.0-320.0                   | 151.0-353.0             |
| Hardness (HBW)                                          | 430-490                                                                                  | 430-490                       | 430-490 (EN ISO 6506-1) |
| Impact energy, Charpy V*<br>(J at 20 °C)                | 8 (specimen thickness 10 mm)                                                             | 11 (specimen thickness 10 mm) | 11 (EN 10083)           |
| Impact energy, unnotched<br>(J at 20 °C, average value) | 335 (specimen thickness 7.5 mm)                                                          | -                             | -                       |
| Tolerances                                              | Download datasheets at <a href="http://ssab.com">ssab.com</a> or by scanning the QR code |                               |                         |

\*Minimum guaranteed mean value

| Temperature             | 20 °C | 300 °C | 400 °C | 450 °C | 500 °C | 600 °C |
|-------------------------|-------|--------|--------|--------|--------|--------|
| Hardness* (HV5)         | 493   | 419    | 378    | 358    | 334    | 236    |
| Yield strength* (MPa)   | 1399  | 1172   | 1082   | 988    | 902    | 577    |
| Tensile strength* (MPa) | 1545  | 1386   | 1286   | 1212   | 1114   | 779    |
| Elongation A5* (%)      | 10    | 12     | 15     | 15     | 17     | 28     |

\*Typical values, not guaranteed

| Toolox® 46 machining test with Coromill 245 |           |                                   |            |
|---------------------------------------------|-----------|-----------------------------------|------------|
| Cutting speed (VC)                          | 100 m/min | Spindle speed (N)                 | 475 rpm    |
| Feed per tooth (FZ)                         | 0.15 mm/t | Table feed (VF)                   | 356 mm/min |
| Max chip thickness (HEX)                    | 0.11 mm   | Effective cutting diameter (DCAP) | 67 mm      |
| Axial cutting depth (AP)                    | 2 mm      | Radial depth of cut               | 47 mm      |
| Total milling length                        | 17,500 mm | Runtime                           | 49 min     |

SSAB is a Nordic and US-based steel company that builds a stronger, lighter and more sustainable world through value added steel products and services. Working with our partners, SSAB has developed SSAB Fossil-free™ steel and plans to reinvent the value chain from the mine to the end customer, largely eliminating carbon dioxide emissions from our own operations. SSAB Zero™, a largely carbon emission-free steel based on recycled steel, further strengthens SSAB's leadership position and our comprehensive, sustainable offering independent of the raw material. SSAB has employees in over 50 countries and production facilities in Sweden, Finland and the US. SSAB is listed on Nasdaq Stockholm and has a secondary listing on Nasdaq Helsinki. Join us on our journey! [www.ssab.com](http://www.ssab.com).



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