Information for the correct steel selection

SPECIAL GRADES FOR ROLLS

To increase the lifetime of your rolls
RUN IN YOUR LEVELER

Chromium: For better wear resistance.
Molybdenum: Improve surface hardness.
Vanadium: Increase toughness and flexibility.

BSA HEAT TREATMENT FACILITIES

VERTICAL HARDENING
Ø 2500x8000 mm - 60 tons

STATIC DEEP HARDENING
Ø 1200x4000 mm - 20 tons

HORIZONTAL HARDENING
Ø 1400x16000 mm - 120 tons

High Frequency
Medium Frequency
Double Frequency
Laser Hardening
Furnace Hardening

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MATERIAL PROPERTIES

Influence of elements in steel chemistry

C:
Carbon is the most relevant element to control hardness characteristics, it is necessary to guarantee the correct martensitic transformation.
Caution:
- High C rate can lead to reduced toughness and is the principal cause of brittleness.
- High C rate can give final undesired metallic structures leading to lack of wear resistance
- High C rate is responsible of thermal shock sensibility and heating cracks propagation.

Cr:
- Chromium carbides increase wear resistance, evenly increase the hardenability, break corrosion phenomena at high temperature, decarburization and oxides, increase mechanical characteristics at high temperature conditions, improve polishability.

Mo:
- Molybdenum is responsible for steel hardenability, increases surface hardening depth because it decreases the critical cooling rate, guarantees uniformity for cross-section hardneress, helps to keep small the austentitic grain during heating leading to fine martensitic structure.

V:
- Vanadium is responsible for high yield strength and elongation and increases compressive strength, giving steel the best toughness and shock resistance capabilities; further increases wear resistance and helps to guarantee low grain size after hardening.

Ni:
- Nickel increases the mechanical characteristic leading to high tensile strength materials, slightly helps hardenability and increases impact strength.

BSA cold working grades:

<table>
<thead>
<tr>
<th>Material DIN</th>
<th>Werkstoff N°</th>
<th>Cr</th>
<th>Mo</th>
<th>V%</th>
<th>Surface Hardness</th>
<th>Tensile strength</th>
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<tbody>
<tr>
<td>51CrMoV4</td>
<td>1.7701</td>
<td>1.1</td>
<td>0.2</td>
<td>0.1</td>
<td>64 —&gt; 66 HRC</td>
<td>860 —&gt; 1100 N/mm²</td>
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<td>800 —&gt; 1000 N/mm²</td>
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</table>

INSPECTION

Metallurgical Laboratory

MATERIAL ANALYSIS

Hard and wear resistant

MEDIUM FREQUENCY
Induction Hardening - Depth 3÷30 mm

ROLLS CROSS SECTION
Sample Test

HIGH FREQUENCY
Induction Hardening - Depth 1÷4 mm

MARTENSITE STRUCTURE

TRANSITION

SORBITE STRUCTURE

Tough and flexible