

Material Data Sheet (Edition 2016)
BRINELLS 400/450/500
Water Quenched Wear Resistant Steel
 Up to 120mm thickness

BRINELLS 400/450/450 is a wear resistant steel with an average hardness of 400/450/500 HBW in delivery condition. Its mechanical properties are achieved by quenching. BRINELLS 400/450/500 is essentially used by the customers where extra resistance to wear is required together with good workability and especially good weldability. All above is possible by low alloy content, low carbon equivalent and controlled water quenching process.

Applications: earth moving and loading machines, excavators, dredgers, skip cars, conveyers, dump trucks, cutting edges, blades, crushers and breakers in a wide spectrum of industries.

PRODUCT DESCRIPTION

BRINELLS 400/450/500 can be delivered in thicknesses from 6 mm to 120 mm, Customized thickness and dimension would be considered based on request.

Depending on thickness, some alloying elements are used solely or in combination, in order to achieve the targeted hardness and mechanical properties.

CHEMICAL COMPOSITION

Steel Grades	Chemical Composition of Ladle Analysis (%)									
	C	Si	Mn	P	S	Al	Cr	B	Ni	Mo
BRINELLS 400	≤ 0.25	≤ 0.60	≤ 1.50	≤ 0.020	≤ 0.010	≤ 0.060	≤ 1.00	≤ 0.0025	≤ 1.00	≤ 1.00
BRINELLS 450	≤ 0.27	≤ 0.60	≤ 1.50	≤ 0.020	≤ 0.010	≤ 0.060	≤ 1.00	≤ 0.0025	≤ 1.00	≤ 1.00
BRINELLS 500	≤ 0.35	≤ 0.60	≤ 1.50	≤ 0.020	≤ 0.010	≤ 0.060	≤ 1.20	≤ 0.0025	≤ 1.00	≤ 1.00

*Values are typical and for reference.

DELIVERY CONDITION

Hot rolled, Quenched & Tempered or Quenched, based on thickness and grade. The steel is fully killed and fine-grain treated.

MECHANICAL PROPERTIES

Steel Grades	Surface Hardness HBW	Yield Strength MPa	Tensile Strength ⁽¹⁾ MPa	Elongation A50 (%)	Impact Test ⁽²⁾ @ -20°C	Cold Bending (90°)
BRINELLS 400	380 - 440	≥ 950	≥ 1200	≥ 12	≥ 21 J	D≥3a
BRINELLS 450	420 - 490	≥ 1050	≥ 1250	≥ 7	≥ 21 J	D≥4.5a
BRINELLS 500	≥ 460	≥ 1100	≥ 1350	≥ 6	≥ 17 J	D≥6a

* Provided data indicative values for thickness ≤ 60mm.

** Hardness range for each grade is guaranteed by manufacturer.

*** All values are typical for thickness of 20mm @ 25°C temperature and indicative only.

**** In spite of high tensile properties, wear resistant steels are not intended for safety relevant components.

(1) For the tensile test, the sample shall be taken transverse to the rolling direction and the test piece with the gauge length of L0=50mm.

(2) For the Charpy test, the sample shall be taken parallel to the rolling direction and from the center.

ULTRASONIC TEST

According to EN10160:2004 S1E1, unless otherwise agreed.

TOLERANCES & SURFACES FINISH

Unless otherwise agreed, tolerances according to EN 10029-1991 (thickness tolerance according to class B, flatness tolerance according to class N type H).

Surface condition, according to EN10163 – 2:2004, Class A, unless otherwise agreed.

MILL TEST CERTIFICATE

According to EN10204:2004, 3.1.

PROCESSING

The entire processing and application techniques are of fundamental importance to the reliability of the products made from this steel. The user should ensure that his design, construction and processing methods are aligned with the material, correspond to the state-of-the-art that the fabricator has to comply with and are suitable for the intended use.

The customer is responsible for the selection of the material. The recommendations regarding job safety in accordance with national rules should be observed while considering the higher strength and hardenability.

COLD FORMING

BRINELLS 400/450/500 can be cold formed by bending in spite of its high hardness and strength. It should be paid attention to the fact that with increasing yield strength, the required forces for the forming operation also grow, even if the plate thickness remains unchanged. The spring-back also increases. In order to avoid the risk of cracking from the edges, flame cut or sheared edges should be ground in the area that is to be cold formed. It is also advisable to round the plate edge slightly on the outside of the bend coming under tension stress during bending.

During the processing, the necessary safety measures have to be taken, so that nobody will be exposed to a danger by a possible fracture of the work piece during the forming process.

HOT FORMING

BRINELLS 400/450/500 obtains its hardness by accelerated cooling from the austenitizing temperature. After hot forming, the same hardness can only be obtained if the steel is quenched again after forming. It is to be expected that the hardness achieved through such a treatment differs from that measured in the delivery condition, because the cooling capacity available during plate manufacturing differs from that available at the fabricator's works.

The steel may be heated to about 250 °C (482 °F) without a substantial drop in hardness.

FLAME CUTTING & WELDING

For flame cutting, thicker plates above 20mm, need pre heat treatment, especially in cold ambient temperature.

For manual arc welding, basic coated rods having a very low residual moisture should be used (if necessary, drying according to the instruction of the manufacturer should be carried out).

Additionally the following recommendations are to be considered:

Weld metals with low yield strength are preferred for tack, root and filler passes. If welds are exposed to wear, only the final passes should be welded with consumables producing a hardness matching the parent plate.

MACHINING

BRINELLS 400/450/500 can be machined with HSS-drills and especially with HSS-Co-alloyed drills with a satisfactory service life if the drill advance and cutting speed are correspondingly adjusted, however we recommend you to check further with relevant tools' manual.

About Brinells

Johan August Brinell is a Swedish engineer in 1900, who developed the most widely used hardness test in engineering and metallurgy.

Typically, steel ball with 10 mm diameter is indented with a typical value of 3,000 kgf into the surface of material and the indentation is measured in Brinell scale.

Brinells has chosen this name, in the memory of Engineer Johan August Brinell, while we intend to remind in minds that we value a single brinell in specification of delivered material and respect all technical needs of our prospects.

Brinells - as a subsidiary of **Alloyed Alliance** (Registered in Ontario – Canada on Aug.2007), is a professional steel trader , supplying specific needs of end users, fabricators and traders in Asia and north America.

In order to support a greener environment and less pollution, a new trend of quenched and tempered, as well as TMCP (Thermo mechanically Controlled Process) steels has been launched in recent decades. BRINELLS has also joined this global concept and we have mainly focused in this category of material.

Brinells, Values Your Special Needs

We are dedicated to serve mining, cement, oil and gas, energy, construction and auto industries.

We supply our steel from premium steel mills in Europe and Asia and have our fast, premium and reliable channels to order our products as required in clients' specification. We are professional trader and stockist of:

- Wear Resistant plates (Grades equivalent to Hardox, Dillidur, Raex, Everhard, Abrex, Durostat, Quard, etc.)
- High Strength Plates (Grades equivalent to Weldox, Strenx, Dillimax, Optim, Alform, Hiten, etc.)
- Pressure Vessel plates (such as A516-70M, NACE and HIC certified)

Original MTC (Material Test Certificate) and inspection reports are all on the name of **Brinells**, however we keep original marking(hard stamp and labels) on plates for further tracking purposes.

For your local representative contact:



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