Creusabro®

Industeel ArcelorMittal

CREUSABRO ® DUAL

Creusabro®Dual is an advanced abrasion-resistant steel with high titanium content (0.6%).

This innovative grade is mainly dedicated to severe sliding wear conditions in service for applications where conventional water quenched steels (500HB, 550HB), overlay plates or hard-cast parts are traditionally implemented.

Based on unrivalled Creusabro®8000 metallurgical concept, Creusabro®Dual is exclusively produced by Oil Quenching, which reduces the level of the residual stresses encountered within the plate after heat treatment.

Main applications

Bucket lining for excavators, backhoes, front loaders, bulldozers;
Wear blades, reinforcements for various types of buckets;
Dump truck bed lining;
Wear parts for primary and secondary crushers;
Lining for vibrating conveyors, grinding units;
Lining for chutes, hoppers;
Screens & Trommels;
Elbows;
Cyclones;
Deflectors;
Demolition grapples (recycling);
Dredging ducts;
Fans.

Hardness

480 HB (450-490 HB) Typical value

Mechanical properties

Typical value

Rp 0.2 : 1200 MPa
Rm : 1630 MPa
A% : 10

Resilience

Typical value

Impact energy 18J à -20°C

Chemical composition

Typical value

C (Max %)	S (Max %)	Ti (Max %)	Mn (Max %)	Ni (Max %)	Cr (Max %)	Mo (Max %)
0.4	0.002	0.60	1.3	0.45	0.7	0.340

153 Rue Aristide berges 73000 CHAMBERY
Numéro SIREN : 788137461
Numéro SIRET : 78813746100042
Numéro TVA Intracommunautaire : FR50788137461

PRODUR ENGINEERED BY WELDING ALLOYS

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Physical properties

Expansion coefficient - (10-6/°C-1)

20/100°C	20/200°C	20/300°C	20/400°C	20/500°C
11.2	12	12.5	13.2	13.8

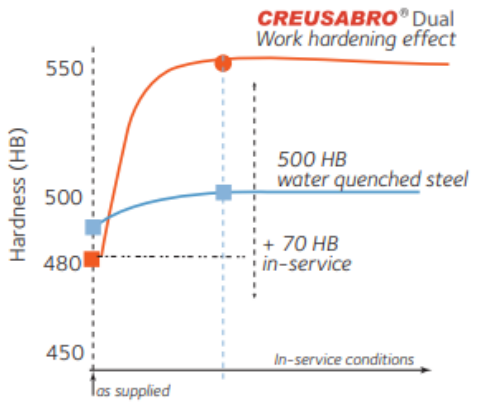
Metallurgical concept

Wear resistance is not solely dependent on the initial hardness of steel; it also relies on various properties such as crack resistance, work hardening effect, strength, ductility, and softening resistance. The overall performance of a wear-resistant steel in service is significantly influenced by the microstructure achieved after thermal processing.

In the case of Creusabro®Dual, the notable enhancement in wear resistance during service can be attributed to specific properties, with a primary focus on the "TRIP effect" - Transformation Induced by Plasticity. Owing to its multiphase structure, comprising a finely-tuned blend of martensite, bainite, and retained austenite, Creusabro®Dual possesses the ability to work-harden when subjected to local plastic deformation in service.

This phenomenon induces a "TRIP effect," where plastic deformation initiates a surface hardening process. This involves the transformation of retained austenite into fresh and exceptionally hard martensite, all while ensuring the material remains ductile underneath. The combination of these characteristics makes Creusabro®Dual highly effective in withstanding both sliding abrasion and heavy impact during service.

Trip effect



Service life

Whatever service conditions are, the original metallurgical concept of Creusabro®Dual gives the material an improve of its performance in terms of wear resistance and processability, compared to other conventional 500 HB water quenched steels, especially for extreme applications, where severe abrasion conditions are combined with huge impact, heat or moderate corrosion.

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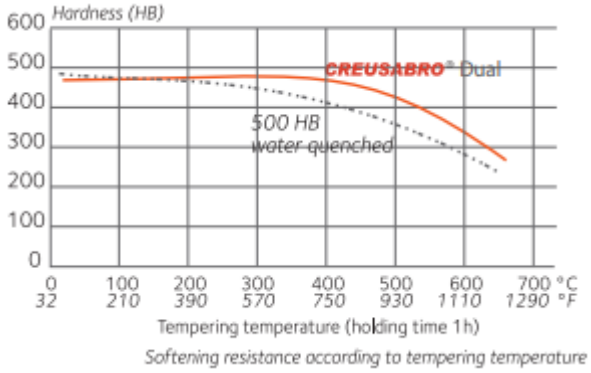
Properties at temperature

Chemical composition of Creusabro®Dual, and specially chromium, molybdenum and huge titanium contents, give a high softening resistance to the material.

This property allows using Creusabro®Dual in hot service conditions, at a maximum of 450°C (840°F) while conventional 500 HB water quenched steels are limited to 250°C (480°F).

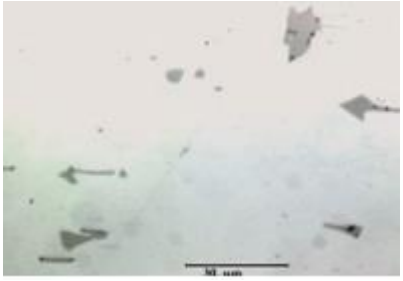


Softening resistance according to tempering temperature

Titanium carbides

The extreme abrasion resistance versus conventional wear resistant steels (500HB, 550HB...) is gained by the presence of the primary titanium carbides which are precipitated during the first stage of the solidification (already present within the semi-products, slab or ingot, before rolling and heat treatment).

These titanium carbides exhibit an average hardness of 3000HV (Vickers hardness) and therefore create numerous hard spots in the steel matrix like crushed gravel in concrete



Dimensionnal program

Contact us.

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Processing

Cutting

All traditional thermal processes (gas-plasma-laser) can be employed. Water jet or laser processes are particularly recommended, providing increased cutting precision and a refined appearance while avoiding or minimizing the heat-affected zone (HAZ). For torch or plasma cutting, preheating to 150°C (302°F) is recommended for thicknesses exceeding 35 mm.

Machining

Creusabro®Dual can be machined using tools equipped with inserted or removable carbide inserts. Deliberate heating operations aimed at localized softening are strictly prohibited. Experience demonstrates that Creusabro®Dual can be cold-formed with an inner radius of 100xThickness, and this can be further reduced by utilizing hot forming up to 450°C.

Welding

Creusabro® Dual can be welded using all conventional processes: manual (SMAW), semi-automatic under gas shielding (GMAW), automatic under flux (FCAW).

The welded areas must be clean, free from grease, water, oxides, etc. Electrodes and flux should be dried according to the supplier's recommendations. For welds without preheating, an austenitic welding wire should be used. The following welding conditions have been employed in our welding trials.