

# Abrasion Resistant steel Quard 400



## 1 Steel description and applications

Duferco Clabecq proposes abrasion resistant steel with an average hardness of 400 HBW which offers a better life cycle to the manufactured products subject to constant wear and significant shocks. Next to its good cold bending properties and its very good weldability, the delivered plates guarantee an ideal combination weight/resistance. The hardness of 400 HBW is the right choice for manufacturers who want to give a higher durability to their products while maintaining excellent workability.

Quard 400 of Duferco Clabecq is mainly recommended for the following applications:

- mining and earthmoving machinery
- crushing and pulverizing equipment
- buckets, knives, crushers, feeders
- presses
- skips
- excavators
- slurry pipe systems
- screw conveyors

## 2 Technical characteristics

### Chemical composition

Heat analysis, %								
C	Si	Mn	P	S	Cr (*)	Ni (*)	Mo (*)	B
≤ 0.16	≤ 0.70	≤ 1.60	≤ 0.025	≤ 0.010	≤ 0.50	≤ 0.25	≤ 0.25	≤ 0.005

(\*) depending on thickness, these elements are used to achieve full hardening

Carbon equivalent, typical values, %		
Plate thickness	CEV <sup>(1)</sup>	CET <sup>(2)</sup>
10-20 mm	0,430	0,290

(1) CEV = C + Mn/6 + (Cr+Mo+V)/5 + (Ni+Cu)/15

(2) CET = C + (Mn+Mo)/10 + (Cr+Cu)/20 + Ni/40

The steel is fully killed and grain refined.

### Mechanical properties

Yield Strength (MPa)	Tensile Strength transverse direction (MPa)	Elongation (%)
1050	1250	10

Hardness	Charpy-V impact test
HBW = 370 - 430	longitudinal at -40°C 30 J

### Testing

Brinell hardness test, HBW according to EN ISO 6506-1, is performed at the surface once per heat and 40 tons.

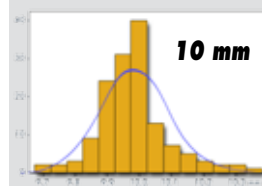
### Tolerances and surface properties

Quard 400 meets the requirements stated in the norms EN 10163-2 about surface properties (class A, subclass 1) and EN 10029 about tolerances:

- thickness: class A
- flatness: class N or S (to the choice of the customer)

At your request, Quard 400 can be proposed with higher levels of tolerance on thickness, giving you the opportunity to enhance your production performance.

Typical thickness tolerance (Duferco Clabecq)



### 3 Dimensions

Quard 400 at present is supplied in the following range:

- thickness: 10 - 20 mm
- width: 1500 - 2500 mm

Duferco Clabecq will continue to broaden its range from 3 to 25 mm. Please surf on our website or contact your local Duferco Clabecq representative for more information.

### 4 Heat treatment

Quard 400 receives the properties by quenching (direct quenching or conventional quenching) and when applicable subsequent tempering. The properties of the delivery conditions cannot be maintained after use of preheating temperatures above 200°C.

### 5 General processing indications

The right choice of material and processing method is of high importance for an effective workability.

#### Thermal cutting

Flame cutting up to 30mm does not require preheating.

#### Machining

Quard 400 offers good machinability with HSS and HSS-Co alloyed drills. The feed rate and cutting speed have to be adjusted to the high hardness of the material.

#### Cold forming

Quard 400 is suitable for cold forming.

The recommended smallest bending radius for Quard 400 is 4 times the plate thickness if longitudinally rolled and 3 times with a transversal rolling. The recommended smallest die opening is 10 times the thickness.

Grinding of flame cut or sheared edges in bending area is recommended to avoid cracking.

A homogeneous springback can be expected.

#### Hot forming

The steel may only be treated up to 200°C without any drop in hardness.

Quard 400 is not intended for further heat treatment.

#### Welding

Quard 400 has a very good weldability for both manual and automatic operations.

Welding consumables giving welds with low hydrogen level are recommended.

Preheating should not be necessary for:

- butt weld and thickness up to 20mm
- austenitic filler metals

Preheating at 125°C-175°C is generally recommended for plate thickness more than 20mm. Preheating beyond 200°C must be avoided.

Weld filler material should be as soft as the construction and wear allow it to be.

In general, the recommendations in accordance with EN-1011 should be observed.



The information given in this data sheet is correct at the time of publishing and is intended to give a general guideline for the purchasing and use of the steels. Values quoted must not be considered as being guaranteed unless specifically confirmed separately in writing.