



ABRO 400

**ABRO 400 IS AN ABRASION
RESISTANT PLATE WITH A
HARDNESS OF 400HBW AND
CAN BE READILY WELDED
AND FABRICATED**

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Abro 400 is an abrasion resistant plate with a hardness of 400HBW and can be readily welded and fabricated.

Applications

Earthmoving and loading equipment, skip liners, buckets and edges, dredgers, conveyors, knives and shears as well as recycling plants.

Hardness

As supplied 370HBW - 430HBW, 400HBW average

Chemical Composition

For the ladle analysis the following values in % are applicable:

C	Si	Mn	P	S
≤ 0.20	≤ 0.50	≤ 1.80	≤ 0.025	≤ 0.010

Depending on thickness the following alloying elements are used singularly or in combination:

Mo	Ni	Cr	V	Nb	B
≤ 0.50	≤ 0.80	≤ 1.50	≤ 0.08	≤ 0.05	≤ 0.005

The steel is fully killed and fine-grain treated.

Typical values for the carbon equivalent:

Plate thickness in mm	≤ 25	> 25 ≤ 30	> 30 ≤ 50	> 50 ≤ 90	> 90 ≤ 150
CEV ¹⁾	0.37	0.44	0.54	0.64	0.72
CET ²⁾	0.27	0.30	0.33	0.36	0.38

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

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

Mechanical Composition

Yield stress	Tensile strength	Elongation	Impact ISO V-notch longitudinal
1000 MPa	1300 MPa	12%	30J @ -40°C

Processing

Profiling

All conventional oxy-gas, plasma or laser methods can be used.

Preheating prior to cutting: 30-50mm thickness 75°C along the cutting line
> 50mm thickness 100°C along the cutting line

Shearing: blades and machine must be in good condition and have adequate power.

Shearing force is twice that required for structural steels.

Punching: punching is possible but is much more difficult than with structural steels.

Power requirements and punch wear will be significantly greater.

Forming

Cold forming

It is advisable to use as generous a radius as possible and ensure the plate temperature is above 10°C. Power requirements are extremely high and springback should be allowed for. To avoid cracking, flame cut or sheared edges should have a 2-3mm wide chamfer ground on top and bottom edges, along the bend circumference.

The following table is valid for bending angles up to 90°, where t = plate thickness

Bending direction (bend axis)	Minimum inside bending radius	Minimum V-block opening
Perpendicular to rolling direction	3t	10t
Parallel to rolling direction	4t	12t

Hot forming: this grade is not suitable for hot forming. Heating above 200°C reduces the as-supplied hardness.

Drilling

8% cobalt armour piercing drills are recommended. The plate to be drilled should be firmly clamped and positioned close to the drill post. An abundant flow of cutting fluid is also required.

The following speeds/feeds are recommended:

5mm dia		10mm dia		15mm dia		20mm dia		30mm dia	
rpm	Feed mm/rev	rpm	Feed mm/rev	rpm	Feed mm/rev	rpm	Feed mm/rev	rpm	Feed mm/rev
570	0.05	290	0.10	190	0.16	150	0.20	90	0.30

Welding

This material is weldable using MMA, MIG and SAW processes. Correct weld preparation is required; grind edges clear of scale and rust and ensure all traces of oil, paint or moisture are removed.

For manual arc welding, basic coated rods with a very low residual moisture content should be used, if necessary stoved in accordance with the manufacturer's recommendations.

Additionally, the following recommendations are to be considered:

In cases of high restraint, to eliminate the possibility of cracking in the welded joint a preheating temperature of 150°C - 200°C (305°F - 395°F) is recommended for thicknesses over 8mm.

Preheating above 200°C (395°F) will cause a decrease in properties as shown in the graph.

Welding consumables should be selected to give the maximum strength possible taking into consideration the type of abrasive wear at the joints.

The temperature band of 300°C - 400°C (570°F - 750°F) should be avoided as this will result in temper embrittlement as well as loss of properties.

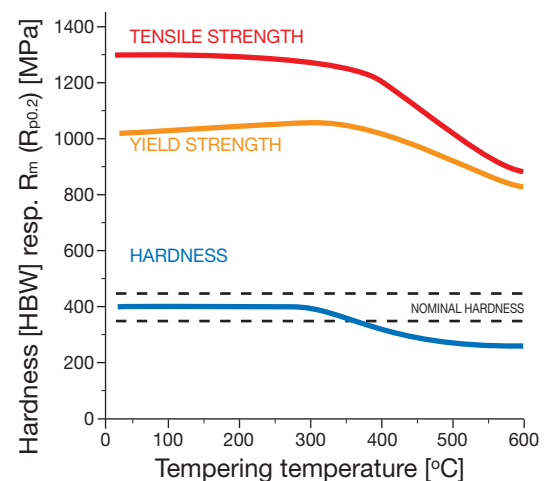
Stud welding is possible without preheat and is an alternative to fixing liner plates by drilling and bolting.

Thickness Range

3mm to 120mm thickness

Note: IMS UK and its suppliers undertake continual material development and the data is a general guide, accurate at the time of printing. Buyers and users should satisfy themselves as to the suitability of the selected steel for their particular application.

INDICATIVE VALUES FOR 20mm PLATE THICKNESS



Processing Facilities

- CAD / CAM Profiling
- Plasma Profiling
- Laser Profiling
- Oxy - gas Profiling
- DXF Compatible
- Perforating
- Forming
- Drilling and Countersinking
- Beveling
- Welded Fabrications

ABRO 400

Part of the IMS Group, with sales offices established in over 14 European countries, IMS UK is a major distributor and processor of Abrasion Resistant and High Yield Steel plate throughout the UK and Ireland.



IMS have an extensive stock of 3mm - 120mm plate, including their branded ABRO range of abrasion resistant grades, and offer full technical and material selection advice and support to provide cost effective solutions for complex applications.

The abrasion resistant stock range comprises standard 400 and 500 brinell grades, 11-14% manganese, as well as the more specialised Creusabro 4800 and Creusabro 8000 materials. Weld overlay Ultraclad 800 offers even higher performance in certain

applications. For high strength and weight saving applications RQT 701 is also available.

With over 100 years of specialist knowledge within the steel industry, the company offers in-house manufacturing facilities, to provide profiled, formed and drilled parts and welded fabrications, supported by a CAD/CAM design service ensuring precision manufactured components.

Spec	Operating Temp	Cold forming	Hot forming	Welding	Drilling	Profiling	Wearlife x Mild Steel	Impact strength
Abro 400	200°C Max	B	X	A	B	GPWL	3 to 4	High
Abro 500	200°C Max	C	X	B	C	GPWL	6 to 8	High
Creusabro 4800	350°C Continuous 400°C Intermittent	B	A	A	B	GPWL	3 to 5	High
Creusabro 8000	300°C Continuous 350°C Intermittent	C	A	B	C	GPWL	8 to 10	High
Abro M	Ambient only	B	B	B	C to X	PWL	20 to 30	Very high
Ultraclad 801	450°C Continuous 600°C Intermittent	A	X	A	X	PWL	20 to 30	Moderate to high
690 Yield	Ambient	A	X	A	A	GPWL	1.5 to 2	Very high

A = Possible
B = Possible with some difficulty
C = Difficult
X = Not possible*

P = Plasma
W = Water jet
L = Laser
G = Gas

*Consult our technical sales for recommended methods of fixing.



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