Material Data Sheet Edition 6, January 2013
Water Quenched Abrasion Resistant Plates
Internal Standard : **ZN-ISD-HC-B/07:2012**

HARTPLAST® 400

Quenched, fine grain wear resistant plates with a nominal hardness of 400HBW and with guaranteed strength and ductility.

APPLICATIONS

HARTPLAST 400 is recommended whenever elevated wear resistance is required as well as high toughness, good cold formability and very good weldability. Examples of application: mining and earthmoving machinery, skips, crushers, pipe systems, breakers, knives, cutting edges, industrial trucks, conveyors.

TECHNICAL CHARACTERISTICS

Plate grade	Thickness [mm]	Chemical composition, [%]							
		C	Mn	Si	Cr	Mo	B	CEV max	CET* typical
HARTPLAST®400	10 ÷ 19	max 0,19	max 1,60	max 0,50	max 1,00	max 0,40	max 0,005	**0,45**	0,31
	20 ÷ 50							**0,60**	0,38

$$CEV = C + \frac{Mn}{6} + \frac{Cr+Mo+V}{5} + \frac{Cu+Ni}{15}$$

$$CET = C + \frac{Mn+Mo}{10} + \frac{Cr+Cu}{20} + \frac{Ni}{40}$$

HARDNESS	**370 ÷ 430 HB**			
MECHANICAL PROPERTIES Tensile and hardness tests are carried out for plates of all thickness range.	R_e min [MPa]	R_m min [MPa]	A_5 min [%]	$KV_{\|-40\ C}$ [J]
	900	**1100**	**9**	**20**
Typical values for 20 mm plate thickness	Re* [MPa]	Rm* [MPa]	A5* [%]	$KV_{\|-40\ C}$* [J]
	1100	1350	10,5	35

* - typical values not guaranteed

DIMENSIONS

Thickness [mm]	Width [mm]	Length [mm]
10 ÷ 12	1750 ÷ 2000	4000 ÷ 8000
>12 ÷ 20	1750 ÷ 2500	
>20 ÷ 50	1750 ÷ 2750	

SURFACE QUALITY

According to EN 10163-2, Class A, Subclass 3.
If agreed by purchaser and manufacturer, surface condition class B is allowed.

TOLERANCES

Length and width tolerances according to EN 10029
Thickness tolerances according to EN 10029, Class A
Tolerances of flatness :

$t \leq 16$mm	15 mm/1m
$16 < t < 25$	10
$25 \leq t < 40$	9
$t \geq 40$	8

t-plate thickness

INTERNAL QUALITY

Internal quality of plates shall meet requirements of class S1 according to EN 10160. If agreed by purchaser and manufacturer plates satisfying requirements of class S2 in accordance with EN 10160 are delivered.

PROCESSING

COLD FORMING

HARTPLAST 400 is suitable for cold bending at room temperature at 90°with following parameters :

Thickness [mm]	Direction	Minimum bending radius	Minimum die opening
8÷20	Transverse	3 t	10 t
	Longitudinal	4 t	12 t

t-plate thickness

THERMAL CUTTING

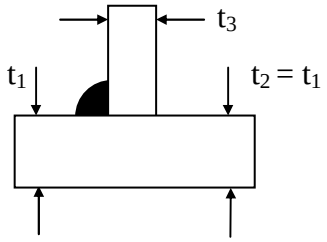
HARTPLAST 400 can be cut using both cold and thermal cutting methods. The cold methods include sawing, shearing, abrasive water jet cutting, and thermal methods include flame, plasma and laser cutting.
Flame cutting should be performed at room or higher temperature. Plates of thickness 25 mm and greater ought to be preheated to 75÷125 °C to avoid cut edge cracking. Preheating can be carried out by means of burner lances, electric heating mats or by heating in a furnace. Preheating plates above 250°C must be avoided due to possible decrease of hardness.

MACHINING

Machining can be carried out using all conventional methods of machining, such as turning, tapping, milling, drilling, etc. HARTPLAST 400 can be machined with high speed steel (HSS and HSS-Co alloyed drills) or cemented carbide (CC) tools.

WELDING

HARTPLAST 400 is suitable for welding using manual and automatic welding technology such as submerged arc welding, gas shielded arc welding or manual welding.
To avoid cold cracking in the welded joints low hydrogen content (≤ 5 ml/100g) welding consumables are recommended. Shielded electrodes must be carefully dried before welding.
Plates of thickness 10÷50 mm should be welded using arc energy (k·U·I ·60/υ·1000) 1,0 to 2,5 kJ/mm accordingly.
Before welding, plates should be preheated to temperature as shown below



$t_1 + t_2 + t_3$ mm	40	50	60	70	80	90	100	110
temp. °C	75				100			175

For heat input =1,7kJ/mm and hydrogen content ≤ 5 ml/100g

The interpass temperature applied should not exceed 225°C.

More information available at New Products and New Technologies Dept. of ISD HCZ
tel. +48 34 323 8409, fax. +48 34 323 2256, e-mail : hcierniak@isd-hcz.com.pl,