HARDOX®
TechSupport

Information from SSAB Oxelösund.

#15

HARDOX® HiTuf in the workshop

HARDOX HiTuf is a wear plate with an extremely high crack resistance. HARDOX HiTuf has a hardness of about 350 HBW and is intended for applications where high demands are imposed on the combination of toughness and abrasion resistance.

Application areas where HARDOX HiTuf is utilised are cutting edges, demolition tools and rippers.

HARDOX HiTuf

Hardness (surface): 310–370 HBW
Brinell hardness according to EN ISO 6506-1, on a milled surface 0,02–0,08 Inches below plate surface.

Mechanical properties (Typical)

	$Rp_{0,2}$ (Ksi)	Rm (Ksi)	A50 (%)	Toughness (CVL) -40F
t = 1½"–2¾"	140	145	18	70ft–lb
t = 2¾"–5"	120	130	18	50 ft–lb

Welding in HARDOX HiTuf

HARDOX HiTuf can by advantage be welded to any other wear plate or structural plate using all the conventinal welding methods available.
The choice of consumables is determined by the requirements on the weld mechnical properties.
To reduced the risk of weld hydrogen cracking the following recommendations are given:

- Use electrodes giving a weld metal yield stress of max 70Ksi.
- If utilizing stick electrodes or flux cored wires, use a basic flux system.
- Keep the weld metal hydrogen content low, less then 5ppm weld metal.

Carbon equivalent (Typical)

Carbon equivalent (Typical)	CEV	CET
t = 1½"–2¾"	0.56	0.38
t = 2¾"–5"	0.64	0.39

CEV = C + Mn/6 + [Cr+Mo+V]/5 + [Cu+Ni]/15
CET = C + [Mn+Mo]/10 + [Cr + Cu]/20 +Ni/40

Recommended preheat temperature

Combined plate thickness	Preheat requirement (F)
3¼"–3½"	170
3½"–4"	200
>4"	300

If preheating can not be fully performed austenitic stainless consumables are recommended to be used.

Cutting in HARDOX HiTuf

Oxygen cutting can be performed without preheating to a plate thickness of 4".

Preheating

Thickness	Preheat requirement (F)
> 3½"	210–250

If cutting can not be performed using preheating, cutting with restricted cutting speeds can be applied. Please contact our technical customer support for more information.

Drilling In HARDOX HiTuf

Individual holes can be drilled with ordinary HSS drills. For rational production, either a microallyed (HSS-E) or a cobalt alloy drill is recommended.

Recommended data for drilling, using HSS/HSS-E and HSS-Co tools

HSS-Drill diameter [mm]	Feed rate, f [in/rev] / Speed, n [rpm]
⅜"	0.004 / 500
½"	0.005 / 300
¾"	0.009 / 250
1"	0.01 / 200
1¼"	0.014 / 180

For improved productivity cemented carbide drills can be used. The use of cemented carbide drills requires stable machines.

Recommended data for drilling using cemented carbide tools

Tool	Cutting speed Vc [in/min]	Feed rate, f [in/rev]
Solid cemented carbide	1600–2000	0.004–0.007
Brazed cemented carbide	1600–2400	0.005–0.007
Indexable inserts	2700–3500	0.004–0.007

Milling In HARDOX HiTuf

To ensure rational production, milling cutters with cemented carbides inserts are recommneded.

Process data for face milling of HARDOX HiTuf.

		Feed rate (Fz)
	ISO Class	0.004–0.008–0.012
Coated cemented carbides	**P40 / C5**	Vc 3720–3000–1920 in/min
	P25 / C6	Vc 7860–6240–5100 in/min
	ISO Class	0.004–0.008
Cermet	P20 / C6–C7	Vc 8640–6660 in/min

Process data for end milling of HARDOX HiTuf.

		Feed rate (Fz)
	ISO Class	0.0008–0.004
Uncoated cemented carbid	K10 / C3	Vc 3540 in/min
Coated cemented carbide	K10 / C3	Vc 5160 in/min
	ISO Class	0.002–0.008
Indexabel carbide insert	P10 / C7	Vc 5520–4080 in/min
	ISO Class	0.001–0.0035
HSS-Co	TiCN coated	Vc 720 in/min

Vc=Cutting speed [in/min]
Fz=feed rate per tooth [in/tooth]

Counterboring and countersinking in HARDOX HiTuf

Counterboring and countersinking are best performed using tools with replaceable cemented carbide inserts and a rotating revolver. Use coolant.

Counterboring and countersinking

	Counter boring	Countersinking
Vc [in/min]	1600–2700	1200–2000
Feed rate, f [in/rev]	0.004–0.008	0.028–0.006
D [in]	**Speed, n [rpm]**	
¾"	670–1090	470–765
1"	530–870	370–610
1¼"	375–610	260–430
1½"	300–500	210–350
2¼"	225–365	160–255

Tapping HARDOX HiTuf

Tapping of HARDOX HiTuf, using coated taps.

	HSS-Co (HSS-E) TiN or TiCN Coated
Vc [in/min]	1000
Size	**Speed, n [rpm]**
⅜"	255
¾"	125
1"	105
1¼"	80
1½"	65

When HARDOX HiTuf plates are being tapped, thread oil or thread paste is recommended to be used as lubricant. If uncoated taps are used, the cutting data should be reduced by 30%.

HARDOX®
WEAR PLATE

HARDOX wear plate only from SSAB Oxelösund
HARDOX is a registered trademark of SSAB Oxelösund.

SSAB
OXELÖSUND

SSAB Oxelösund AB
SE-613 80 Oxelösund
Sweden

Phone +46 155 25 40 00
Fax +46 155 25 70 73
www.ssabox.com
www.hardox.com

HF-15-HiTuf workshop-us-02-2004