

Uddeholm Nimax®

Welding recommendations

GENERAL

Uddeholm Nimax is a low carbon plastic mould steel delivered at a hardness of ~40 HRC. The excellent machinability and easy weldability, no preheating or post treatment necessary, reduce the manufacturing time and make the maintenance much easier.

Good results when welding can be achieved if proper precautions are taken (joint preparation, choice of consumables and welding procedure). Uddeholm Nimax TIG-Weld is a TIG filler rod specially composed as to be compatible with the mould steel Uddeholm Nimax. Uddeholm Nimax TIG-Weld gives a weld metal identical in composition to Uddeholm Nimax and is characterized by:

- very good melting properties
- high impact and fracture toughness
- good polishing and texturing properties

RECOMMENDED FILLER MATERIAL

Welding Method	Gas Tungsten Arc Welding GTAW (TIG)	Gas Metal Arc Welding GMAW (MIG/MAG)	Shielded Metal Arc Welding SMAW (MMA)	Laser	Comments
Filler material	Nimax TIG	Nimax MIG	Impax Weld	Nimax Laser Weld	If the surface is going to be photo-etched Nimax TIG or Nimax Laser Weld is recommended
	Type AWS ER 312				Use soft filler material for buffering layer
Hardness as welded	40 HRC	40 HRC		40 HRC	

DIMENSIONS FILLER MATERIAL

Type	TIG		MIG	MMA			Laser
Dia. Ø mm	1.0	1.6	1.2	2.5	3.25	4.0	0.2 – 0.6
Dia. Ø Inch	0.040	1/16	3/64	3/32	1/8	5/32	0.008 – 0.024
Nimax TIG Weld	X	X					
Nimax MIG Weld			X				
Impax Weld				X	X	X	
Nimax Laser Weld							X

PARAMETERS

Condition	Prehardened 40 HRC	Comment
Preheating Temperature	175°C ± 25°C 345°F ± 50°F	Preheating is not necessary, but if it is desired, a temperature at 175°C ± 25°C 345F ± 50°F is recommended Start with buffering layers if not all cracks are removed
Interpass temperature	Max 150°C, 270°F above preheating temperature	The temperature of the tool in the vicinity of the weld should not exceed 300°C, 570° F. When passed, the tool will have a risk for distortion increases.
Cooling rate	20 - 40°, 35 - 70°F C/h The first 2 hours then freely in air <70°C, 160°F	
Post treatment	450°C (840°F) for 2 hours	Post treatment is normally not required. However, in cases when high strain could be expected (for example deep groove preparations, large welded areas and fillet welds) a stress relieving at 450°C (840°F) for 2 hours is recommended. Heat treatment above 500°C (930°F) should be avoided because it will reduce the hardness as well as the toughness of Uddeholm Nimax.

PROCEDURES

- Clean weld area.
- Preheating is not necessary, but if it is desired, a temperature at $175^{\circ}\text{C} \pm 25^{\circ}\text{C}$ $345\text{F} \pm 50^{\circ}\text{F}$ is recommended
- Do not let the temperature in the vicinity of the weld (the HAZ) increase to more than $300^{\circ}\text{C} / 570^{\circ}\text{F}$. There is a risk of lowering (softening) the hardness of the base material or/and cracking in the HAZ. Use temple sticks or other temperature-measuring devices.
- For finishing layers use consumables which give suitable hardness.
- Wait a few minutes between each layer of strings, both for soft and hard filler, in order to let the layer equalize and minimize stresses. Peen to minimize stresses.
- If possible, change welding direction 180° between each layer.
- Cool slowly after welding, $20 - 40^{\circ}\text{C}/\text{h}$, $35 - 70^{\circ}\text{F}/\text{h}$ for the first two hours and then freely in air $< 70^{\circ}\text{C} / 160^{\circ}\text{F}$.
- Post treatment is normally not required. However, in cases when high strain could be expected (for example deep groove preparations, large welded areas and fillet welds) a stress relieving at 450°C (840°F) for 2 hours is recommended. Heat treatment above 500°C (930°F) should be avoided because it will reduce the hardness as well as the toughness of Uddeholm Nimax.

Use these guideline recommendations along with
“Welding of Uddeholm Tool Steel” for complete instructions.