

Welding recommendations — Uddeholm Vanadis® 8 SuperClean

FILLER MATERIAL

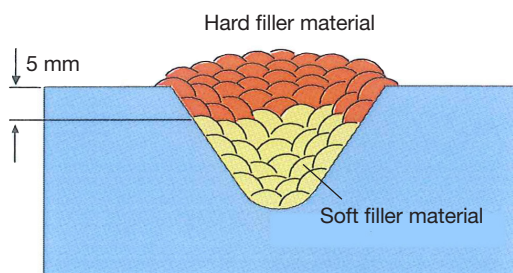
Welding method	Gas Tungsten Arc Welding, GTAW (TIG)	Shielded Metal Arc Welding, SMAW (MMA)	Comment
Filler material	Type AWS ER 312 Type AWS ER NiCrMo-3 Type AWS ER NiCrMoFe-3 UTP A696 Cut bars from Vanadis 8 1.5 x 1.5 mm	Not recommended	Use soft filler material for buffering layer
Hardness as welded	60–64 HRC		

PERFORMANCE

Condition	Soft Annealed 260 HB	Hardened 60–64 HRC	Comment
Preheating temperature	375°C ± 25°C (710°F ± 45°F)	275°C ± 25°C (710°F ± 45°F)	The temperature should be kept constant during the welding operation. Start with buffering layers, peen the strings. Wait a few minutes between each layer of strings. <i>Minor repairs up to 3 strings can be made without buffering layer.</i>
Interpass temperature	Max 150°C (270°F) above preheating temperature	Max 150°C (270°F) above preheating temperature	The temperature of the tool in the vicinity of the weld. When passed there is a risk for distortion of the tool or soft zones around the weld.
Cooling rate	20–40°C (35–70°F) / h the first 2 hours then freely in air <70°C (160°F)		
Post treatment	Soft anneal Harden Temper	Temper 20°C (35°F) below previous tempering temperature	Holding time when tempering, 2 h. The temperature depends on the last used tempering temperature. When soft annealing and hardening, see heat treatment specification.

PROCEDURES

- Clean weld area
 - Preheat material to $375^{\circ}\text{C} \pm 25^{\circ}\text{C}$ ($710^{\circ}\text{F} \pm 45^{\circ}\text{F}$) and maintain temperature during welding
 - Do not let the temperature in the vicinity of the weld increase 150°C (270°F) above the preheating temperature (risk of lowering the hardness of base material or cracking). Use temple sticks or other temperature measuring device.
 - Use soft filler material for initial layers. Low heat input, max 80 A.
 - 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, if possible use preheating furnace. Peen to minimize stresses.
- Use max 80 A.**
- If the area with hard filler material is below 5 mm, in thickness, then use one layer of soft filler material. Minor repairs up to 3 strings can be made without buffering layer.



Buffering layers on large repairs.

- If possible, change welding direction 180° between each layer.
- Cool slowly after welding, $20\text{--}40^{\circ}\text{C} / \text{h}$ ($35\text{--}70^{\circ}\text{F} / \text{h}$) for the first two hours and then freely in air $<70^{\circ}\text{C}$ (160°F)
- Temper 20°C (35°F) below previous tempering temperature for two hours.
- Tools welded in the annealed condition must undergo a full soft annealing immediately after welding. Allow tool to cool to room temperature before soft annealing.
- Shielded Metal Arc Welding – SMAW (MMA) is **not** recommended

Use these guidelines along with Uddeholm "Welding of tool steels" for complete instructions.

PRECAUTIONS

Uddeholm does not recommend welding of Uddeholm Vanadis 8 SuperClean, and does not guarantee the results. This document should be used as a guideline for TIG-welding only.
