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PREPARATION METHOD TIG WELD JOINT

Objective:

Our current project focuses on the microstructural representation of a tungsten inert gas (TIG) steel weld joint. The investigation requires precise metallographic preparation in order to analyze the weld zone and the heat-affected zone in detail.

The preparation of the sample is a multi-step process that includes cutting, mounting (hot), grinding, polishing and finally etching the sample. This examination allows us to gain insight into the microstructure of the weld and identify potential defects or changes at a microscopic level. The microstructure analysis is vital for assessing the quality of the weld joint and making possible optimizations to the welding process.

CUTTING



Cut-off machine Qcut 250 A

Device	Qcut 250 A	
Cut-off disc	FS-C 250	Item no.: 95012527
Coolant and anti-corrosion agent	ATM Cool Cut	Item no.: 95004145
Clamping tool	- Qtool 60 - Easy clamping base M	
Cutting method	Automatic horizontal cutting (with X-axis)	
Parameter	Feeding speed	0,3 mm/s
	Pulse setting	Without pulse
	Rotational speed of cut-off disc	Constant rotational speed
		3015 rpm

Note Always ensure that the workpiece is securely clamped



Hot mounting material EPO BLACK



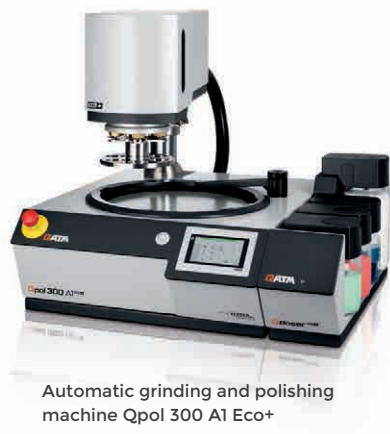
Hot mounting press Qpress 50

HOT MOUNTING

Device	Qpress 50	
Mounting material	EPO BLACK	Item no.: 95011990
Heating time	5:00 min	
Temperature	185 °C	
Pressure	250 bar	
Cooling time	2:00 min	
Accessories	-	
Heat set up	100%	
Pressure mode	From start	
Cooling set up	100%	
Note		

GRINDING/POLISHING

Device	Qpol 300 A1 Eco+
Sample holder	Item no.: Z5446025
Pressure	Single pressure



Automatic grinding and polishing machine Qpol 300 A1 Eco+

STEP	MEDIUM		 rpm	 rpm	 Single Pressure N	 min
 Pre-grinding	SiC-paper P320 + Quick-Tap	H ₂ O	200	120 ◄► Counter Rotation	30	1:00 Until plane
 Grinding	SiC-paper P600 + Quick-Tap	H ₂ O	200	120 ◄► Counter Rotation	30	0:45
 Grinding	SiC-paper P1200 + Quick-Tap	H ₂ O	200	120 ◄► Counter Rotation	30	0:45
 Polishing	SIGMA	Dia-Complete Poly, 3 µm	120	100 ►► Synchronous Rotation	30	4:00
 Final polishing	OMEGA	Eposil F 0.1 µm	100	90 ◄► Counter Rotation	20	1:30 (H ₂ O during final 0:20)
 Etching (chemical)	Nitric acid 3% (alc.)					0:05
Bemerkungen	- Pre-dosing time for 3 µm and 0.1 µm = 3 s - Dosing interval and dosing time for 3 µm = every 45 s for 2 s - Dosing interval and dosing time for 0.1 µm = every 20 s for 1 s					

MICROSTRUCTURES

TIG welding zone and
heat-affected zone
after etching with
3% nitric acid – 100 x



TIG welding zone and
heat-affected zone
after etching with
3% nitric acid – 200 x



The microstructure of the
welding joint after etching
with 3% nitric acid – 200 x



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