PREPARATION METHOD

QUALITY ASSURED

Copper and copper alloys

Recommended machines and additional consumables (not included)

CUTTING	**Equipment** ATM Brillant	**Consumables** Cut-off wheel: corundum, resin bond Anti-corrosion coolant
MOUNTING	**Equipment** ATM Opal	**Consumables** Hot mounting: Bakelite red/black, Thermoplast Cold mounting: KEM 20, KEM 30 **Hot mounting prefered**
GRINDING/ POLISHING	Sample size Ø 40 mm	

Pressure parameters and specimen size

Specimen diameter [mm]	25	30	40	50	60
Divergence in pressure used in the preparation methods	-(5 N...10 N)	-5 N	0	+5 N	+(5 N...10 N)

Notes:

STEP	MEDIUM		rpm		Single Pressure N	min
Planar grinding	SiC-paper/foil P320 (280)	H_2O	250-300	►► Synchronous Rotation	30	Until plane
Pre-polishing	BETA	Dia-Complete Poly, 9 µm	120-150	►► Synchronous Rotation	30	3:00-4:00
Polishing	SIGMA	Dia-Complete Poly, 3 µm	120-150	►► Synchronous Rotation	30	3:00-4:00
Final polishing	OMEGA	Eposil F 0.1 µm*	120-150	◄► Counter Rotation	15	1:00-2:00* (H_2O during final 0:30)
Optional etching (chem.)	Cu Etchant A (chloride version)**					Approx. 0:02

* 50 ml Eposil F + 1 ml H_2O_2 + 1 ml NH_3, otherwise polishing time x2

** ATM Item No. 95000508

BEGINNERS GUIDE

CUTTING
- Use suitable cut-off wheels (e.g. ATM NF-A wheels)
- Constant cutting speed max. 0.25 mm/s

MOUNTING
- Use mounting material with high edge retention

GRINDING
- Grind with SiC-paper/foil P320 (280)
- Thoroughly wash samples and holder under running water after each grinding step
- Use 1 sheet of SiC-paper/foil for maximum 4 samples

POLISHING
- For new materials start with longest recommended step times and optimize to shorter times
- Soft high purity copper requires only ½ contact pressure (15 N) and prolonged OMEGA step (5 min)
- Rinse the polishing discs with water and spin dry after use
- Do not stack discs with different diamond sizes
- Clean samples, holders and hands under running water before each polishing step
- Use ethanol and blow dryer to avoid water stains
- Check after each step under the microscope if polishing marks are of equal size and randomly oriented
- Rinse the OMEGA disc with water and spin dry after use
- Use the consumables only for copper and not for other materials
- Rinse the cap of the Eposil F bottle after use, put cap back on

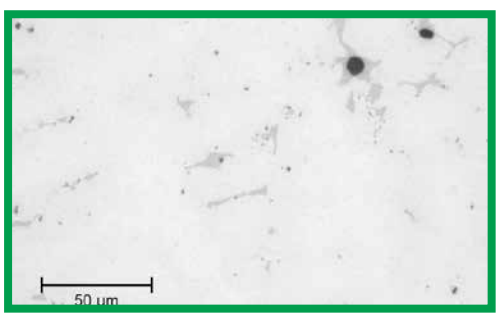
Notes:

SAMPLE MICROGRAPHS

OK Sample polished

20x micrograph of cast bronze after OMEGA polishing

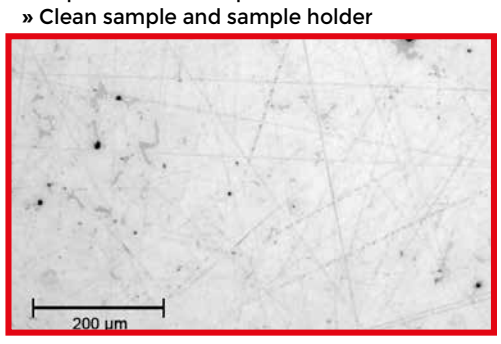
- CuSn intermetallic defined
- Pores from casting visible, minimal residual scratches
- No pittings or relief from over-polishing



NOK Sample polished

10x micrograph of cast bronze after OMEGA polishing

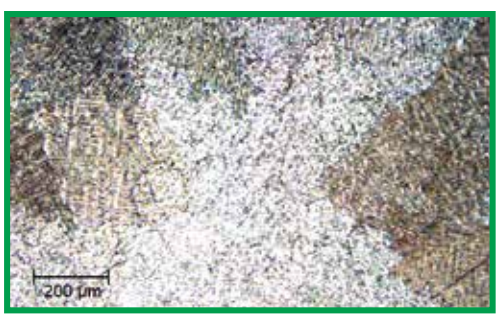
- Scratches from 3 µm step after OMEGA
  » Clean all polishing discs with clean brush under running water
  » Repeat OMEGA step
  » Clean sample and sample holder



OK Etched Sample A

10x micrograph of cast bronze, etched with Cu Etchant A

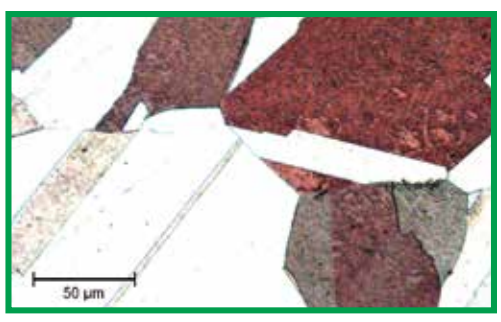
- Good brightness contrast between regions of different dendrite orientation



OK Etched Sample B

20x micrograph of Cu, etched with Cu Etchant A after 5 min OMEGA polishing

- Grain boundaries and twinning discriminable
- Almost no residual scratches



Notes: