

Magnesium based alloys

Recommended machines and additional consumables (not included)

CUTTING	Equipment ATM Brillant	Consumables Cut-off wheel: diamond, resin bond Anti-corrosion coolant
MOUNTING	Equipment ATM Opal	Consumables Hot mounting: Bakelite red/black/green Cold mounting: KEM 20 Hot or cold mounting
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	H ₂ O	rpm		Single Pressure N	min
Planar grinding	SiC-paper/foil P320 (280)*	H ₂ O	250-300	▶▶ Synchronous Rotation	15	Until plane
Planar grinding	SiC-paper/foil P800 (280)*	H ₂ O	250-300	▶▶ Synchronous Rotation	15	1:00
Planar grinding	SiC-paper/foil P1200 (280)*	H ₂ O	250-300	▶▶ Synchronous Rotation	15	1:00
Polishing	BETA	Diamond suspension (alcohol or oil based Poly, 9 µm)	120-150	▶▶ Synchronous Rotation	15	5:00
Polishing	SIGMA	Diamond suspension (alcohol or oil based Poly, 3 µm)	120-150	▶▶ Synchronous Rotation	15	5:00
Polishing	ZETA	Diamond suspension (alcohol or oil based Poly, 1 µm)	120-150	▶▶ Synchronous Rotation	15	5:00
Final polishing	OMEGA**	Etosil E, 0.06 µm**	120-150	◀◀ Counter Rotation	25	4:00 (ethanol during final 0:30)
Optional: Final polishing	OMEGA Saphir Vibro	Etosil E, 0.06 µm**				20:00
Optional: Etching (chem.)	Nital 3%***					Approx. 0:03-0:10 (ethanol for 0:30)

* Coat grinding paper/foil with paraffin wax before grinding to reduce the contamination of the sample by SiC particles

** Wet the OMEGA polishing cloth with ethanol before polishing

*** ATM Item No. 95005033

**** ATM Item No. 92002597

Notes:

BEGINNERS GUIDE

CUTTING	<ul style="list-style-type: none"> Use suitable cut-off wheels for magnesium material (e.g. ATM FS-A wheels) Constant cutting speed max. 0.25 mm/s
MOUNTING	<ul style="list-style-type: none"> Use mounting material with high edge retention Hot or cold mounting both possible
GRINDING	<ul style="list-style-type: none"> Coat grinding paper/foil with paraffin wax before grinding to reduce the contamination by SiC particles Start grinding with SiC-paper/foil P320 (280) Continue with P800 and P1200 Thoroughly wash samples and holder under running water after each grinding step
POLISHING	<ul style="list-style-type: none"> 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 Wet the OMEGA polishing cloth with ethanol before polishing Use the consumables only for magnesium based alloys and not for other materials Rinse the spray nozzle of the Etosil E bottle after use, put cap on nozzle

Notes:

SAMPLE MICROGRAPHS

OK Sample polished

20x micrograph of magnesium after OMEGA polishing

- No traces of scratches
- Clean homogeneous surface
- Pores and inclusions with perfect edges



NOK Sample polished

20x micrograph of magnesium after Etosil polishing

- Sparse scratches from 0.06 µm Eposal after OMEGA
 - » Clean all polishing discs with clean brush under running water
 - » Clean sample and sample holder
 - » Repeat OMEGA step



20x micrograph of magnesium etched with Nital

- No traces of scratches
- Clear structure

