

## Aluminium based alloys

### Recommended machines and additional consumables (not included)

<b>CUTTING</b>	<b>Equipment</b> ATM Brillant	<b>Consumables</b> Cut-off wheel: corundum, resin bond Anti-corrosion coolant
<b>MOUNTING</b>	<b>Equipment</b> ATM Opal	<b>Consumables</b> Hot mounting: Bakelite red/black Cold mounting: KEM 20, KEM 30 <b>Hot mounting preferred</b>
<b>GRINDING/ POLISHING</b>	<b>Sample size</b> 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 <sub>2</sub> O	rpm		Single Pressure N	min
Planar grinding	SiC-paper/foil P320 (280)	H <sub>2</sub> O	250-300	▶▶ Synchronous Rotation	25	Until plane
Pre-polishing	BETA	Dia-Complete Poly, 9 µm	120-150	◀◀ Counter Rotation	25	3:00-5:00
Polishing	SIGMA	Dia-Complete Poly, 3 µm	120-150	▶▶ Synchronous Rotation	30	3:00-5:00
Final polishing	OMEGA	Eposil F 0.1 µm	120-150	◀◀ Counter Rotation	20	1:00-2:00 (H <sub>2</sub> O during final 0:30)
Optional: Etching (chem.)	Kroll 's Reagent*					Approx. 0:30

\* ATM Item No. 92004492

### BEGINNERS GUIDE

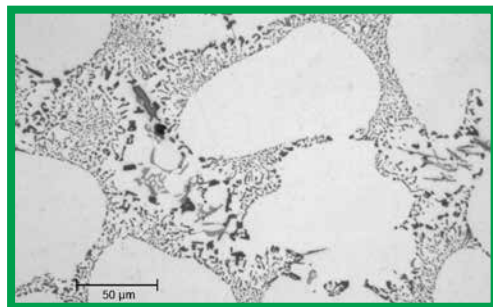
<b>CUTTING</b>	<ul style="list-style-type: none"> <li>Use suitable cut-off wheels for non-ferrous material (e.g. ATM NF-A wheels)</li> <li>Constant cutting speed max. 0.25 mm/s</li> </ul>	<b>Notes:</b>
<b>MOUNTING</b>	<ul style="list-style-type: none"> <li>Use mounting material with high edge retention</li> </ul>	
<b>GRINDING</b>	<ul style="list-style-type: none"> <li>Grind with SiC-paper/foil P320 (280)</li> <li>Thoroughly wash samples and holder under running water after each grinding step</li> <li>Use 1 sheet of SiC-paper/foil for maximum 4 samples</li> </ul>	
<b>POLISHING</b>	<ul style="list-style-type: none"> <li>For new materials start with longest recommended step times and optimize to shorter times</li> <li>Rinse the polishing discs with water and spin dry after use</li> <li>Do not stack discs with different diamond sizes</li> <li>Clean samples, holders and hands under running water before each polishing step</li> <li>Use ethanol and blow dryer to avoid water stains</li> <li>Check after each step under the microscope if polishing marks are of equal size and randomly oriented</li> <li>Rinse the OMEGA disc with water and spin dry after use</li> <li>Use the consumables only for aluminium based alloys and not for other materials</li> <li>Rinse the cap of the Eposil F bottle after use, put cap back on</li> </ul>	

### SAMPLE MICROGRAPHS

#### OK Sample polished

20x microscopy of Al-Si casting after OMEGA polishing

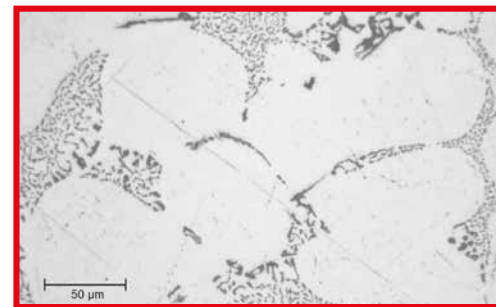
- Primary aluminium phase free of scratches and pittings
- Eutectic and intermetallic phases clearly visible



#### NOK Sample polished

20x microscopy of Al-Si casting after OMEGA polishing

- Long scratches despite OMEGA step
  - » OMEGA disc contaminated with large particles
  - » Wash disc under running water, spin dry at 500 RPM
  - » Clean sample and sample holder
- Interrupted shallow scratches, pores in line formation
  - » Longer OMEGA step



#### OK Etched Sample

10x micrograph of Al fusion weld, etched with Kroll 's reagent for 15 sec

- Heat-affected zone and base material (left to right) clearly discernable
- No residual scratches, no relief

