

SAMPLE PREPARATION

Standard preparation methods
for materialographic analysis

Practical experience QATM-Lab

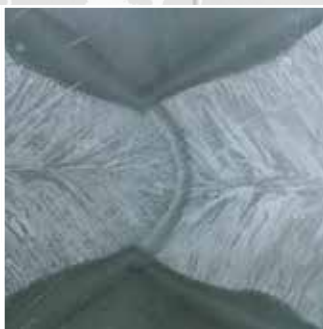
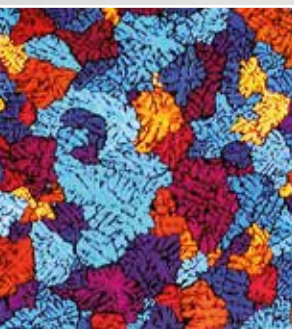


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NOTES:

The preparation methods can be applied for properly sectioned and burred samples. Parameters like pressure (given as force in newton) are referred to single pressure and depend on sample size.

For samples \neq 40mm these values have to be adjusted with the help of table „Pressure parameters and sample size“.

Instead of the Dia Complete diamond suspensions common diamond suspensions in combination with lubricants (water or alcohol based) can be used. Mind right dosage!

The velocity of the sample holder is 100 rpm and can vary depending on the specific material.

Due to the diversity of materials and examination aims the provided standard preparation methods might not cover all applications. In this case contact our application lab; our team will support you with customized preparation methods.

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GENERAL INFORMATION

Grit conversion chart

Grain size [µm, approx.]	FEPa (P) (Europe)	ANSI/CAMI (USA)	JIS (Japan)
269	P60	60	
250			F60
201	P80		
188		80	
180			F80
162	P100		
148		100	
127	P120		F100
116		120	
106			F120
78	P180	180	
66		220	
63			F180
60			240
58.5	P240		
52.2	P280	240	280
46.2	P320		320
42.3		280	
40	P360		360
35	P400	320	400
30.2	P500		
28			500
27.3		360	
25.8	P600		
24			600
21.8	P800	400	
18.3	P1000	500	800
15.3	P1200	600	1000
13			1200
12.6	P1500	800	
10.3	P2000		1500
9.2		1000	
8.4	P2500		2000
7.5			2500
6.5		1200	
5	P4000		

Pressure parameters and sample size

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














Notes: The preparation methods can be applied for proper sectioned and burred sample. Parameters like pressure (given as force in newton) are referred to single pressure and depend on sample size. For samples ≠ 40mm these values have to be adjusted.

Reference:
Analytical Characterization of Aluminum, Steel, and Superalloys
D. Scott MacKenzie, George E. Totten, October 10, 2005 by CRC Press
ISBN: 9780824758431

JIS R 6001-1:2017-01-20
Bonded Abrasives - Determination And Designation Of Grain Size Distribution - Part 1:
Macrogrits F4 To F220, Beuth-Verlag, Berlin, 2017















JIS R 6001-2:2017-01-20
Bonded abrasives - Determination and designation of grain size distribution - Part 2:
Microgrits (Foreign Standard), Beuth-Verlag, Berlin, 2017

EXPLANATION OF SYMBOLS

Symbol	Meaning	Symbol	Meaning
	Cutting		Single pressure
	Mounting		Speed grinding disc
	Grinding / Polishing		Speed sample holder
	Grinding / Polishing		Synchronous rotation of sample holder
	Etching		Counter rotation of sample holder
	Pre-polishing		Time
	Polishing / diamond		Dosing lubricant
	Final polishing		Lubricant water based
			Lubricant alcohol based

PREPARATION METHOD


















ALUMINUM ($\geq 99.7\%$) AND WROUGHT ALUMINUM ALLOY

 CUTTING		Equipment QATM Qcut / Brillant	Consumables Cut-off wheel: corundum, resin bond Anti-corrosion coolant				
 MOUNTING		Equipment QATM Qpress / Opal	Consumables EPO black, EPO-Max, Bakelite red/black KEM 15 plus, KEM 20, KEM 30			Method Hot mounting Cold mounting	
 GRINDING/ POLISHING		Equipment QATM Qpol / Saphir Sample size \varnothing 40 mm					
STEP	MEDIUM		 rpm		 N	 min	
 Planar grinding	SiC-paper/foil* P320 (280)	H ₂ O	250-300	▶▶ Synchronous rotation	20	Until plane	
 Grinding	SiC-paper/foil* P600 (400)	H ₂ O	250-300	▶▶ Synchronous rotation	20	1:00	
 Grinding	SiC-paper/foil* P1200 (600)	H ₂ O	250-300	▶▶ Synchronous rotation	20	1:30 (change SiC paper/foil after 0:60)	
 Polishing	GAMMA/DELTA	Dia Complete Poly, 3 μ m	120-150	▶▶ Synchronous rotation	30	6:00	
 Final polishing	LAMBDA/OMEGA	Eposil F, 0.1 μ m	120-150	◀▶ Counter rotation	20	2:00 (H ₂ O during final 0:30)	
 Optional: Etching (electrolytic)	Barker's reagent					30 V	

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













PREPARATION METHOD

ALUMINUM ALLOYS

 CUTTING		Equipment QATM Qcut / Brillant	Consumables Cut-off wheel: corundum, resin bond Anti-corrosion coolant				
 MOUNTING		Equipment QATM Qpress / Opal	Consumables Bakelite black/red KEM 20, KEM 30 Hot mounting preferred			Method Hot mounting Cold mounting	
 GRINDING/ POLISHING		Equipment QATM Qpol / Saphir Sample size \varnothing 40 mm					
STEP	MEDIUM		 rpm		 N	 min	
 Planar grinding	SiC-paper/foil P320 (280)	H ₂ O	250-300	 Synchronous rotation	25	Until plane	
 Pre-polishing	BETA	Dia Complete Poly, 9 μ m	120-150	 Counter rotation	25	3:00-5:00	
 Polishing	SIGMA	Dia Complete Poly, 3 μ m	120-150	 Synchronous rotation	30	3:00-5:00	
 Final polishing	LAMBDA/OMEGA	Eposil F, 0.1 μ m	120-150	 Counter rotation	20	1:00-2:00 (H ₂ O during final 0:30)	
 Optional: Etching (chemical)	Kroll's reagent					Approx. 0:30	















PREPARATION METHOD

CARBON/GLASS FIBER REINFORCED COMPOSITES (CFC/GFC)

 CUTTING		Equipment QATM Qcut / Brillant	Consumables Cut-off wheel: diamond, metal bond (bronze) Anti-corrosion coolant				
 MOUNTING		Equipment Pressure unit	Consumables KEM 15 plus, KEM 20			Method Cold mounting	
 GRINDING/ POLISHING		Equipment QATM Qpol / Saphir Sample size \varnothing 40 mm					
STEP	MEDIUM		 rpm		 N	 min	
 Planar grinding	SiC-paper/foil P320 (280)	H ₂ O	250-300	▶▶ Synchronous rotation	35	Until plane	
 Pre-polishing	ALPHA/BETA	Dia Complete Poly, 9 μ m	250-300	◀▶ Counter rotation	30	5:00	
 Polishing	GAMMA/DELTA	Dia Complete Poly, 3 μ m	250-300	▶▶ Synchronous rotation	30	5:00	
 Final polishing	LAMBDA/OMEGA	Eposal, 0.06 μ m	120-150	◀▶ Counter rotation	20	1:30 (H ₂ O during final 0:30)	

PREPARATION METHOD














CAST IRON (GJS/GJL)

 CUTTING		Equipment QATM Qcut / Brillant	Consumables Cut-off wheel: corundum, resin bond Anti-corrosion coolant				
 MOUNTING		Equipment QATM Qpress / Opal	Consumables EPO black, EPO-Max, Bakelite red/black KEM 30			Method Hot mounting Cold mounting	
 GRINDING/ POLISHING		Equipment QATM Qpol / Saphir Sample size \varnothing 40 mm					
STEP	MEDIUM		 rpm		 N	 min	
 Planar grinding	SiC-paper/foil P320 (280)	H ₂ O	250-300	▶▶ Synchronous rotation	30	Until plane	
 Grinding	SiC-paper/foil P600 (400)	H ₂ O	250-300	▶▶ Synchronous rotation	30	1:00	
 Grinding	SiC-paper/foil P1200 (600)	H ₂ O	250-300	▶▶ Synchronous rotation	30	1:00	
 Polishing	SIGMA/GAMMA	Dia Complete Poly, 3 μ m	120-150	▶▶ Synchronous rotation	25	5:00	
 Final polishing	LAMBDA/OMEGA	Eposal, 0.06 μ m	120-150	◀▶ Counter rotation	20	1:00 (H ₂ O during final 0:30)*	
 Optional: Etching (chemical)	Nital 3%					0:03-0:10	

* Rinsing with water can cause corrosion

PREPARATION METHOD













SOFT TO MEDIUM-HARD STEEL (<35 HRC/350HV)

 CUTTING		Equipment QATM Qcut / Brillant	Consumables Cut-off wheel: corundum, resin bond Anti-corrosion coolant				
 MOUNTING		Equipment QATM Qpress / Opal	Consumables EPO black, EPO-Max, Bakelite red/black KEM 15 plus			Method Hot mounting Cold mounting	
 GRINDING/ POLISHING		Equipment QATM Qpol / Saphir Sample size \varnothing 40 mm					
STEP	MEDIUM		 rpm		 N	 min	
 Planar grinding	SiC-paper/foil P320 (280)	H ₂ O	250-300	▶▶ Synchronous rotation	30	Until plane	
 Pre-polishing	BETA	Dia Complete Poly, 9 μ m	120-150	◀▶ Counter rotation	35	5:00	
 Polishing	SIGMA/GAMMA	Dia Complete Poly, 3 μ m	120-150	▶▶ Synchronous rotation	30	6:00	
 Final polishing	LAMBDA/OMEGA	Eposal, 0.06 μ m*	120-150	▶▶ Synchronous rotation	20	1:00 (H ₂ O during final 0:30)	
 Optional: Etching (chemical)	Nital 3% (micro), Adler's reagent (macro)					Approx. 0:03-0:10 Approx. 0:03-0:10	

* For weld analysis














PREPARATION METHOD

MEDIUM-HARD TO HARD STEEL (30-65 HRC/850HV)

 CUTTING		Equipment QATM Qcut / Brillant		Consumables Cut-off wheel: corundum, resin bond Anti-corrosion coolant		
 MOUNTING		Equipment QATM Qpress / Opal		Consumables EPO black, EPO-Max KEM 15 plus Hot mounting preferred		Method Hot mounting Cold mounting
 GRINDING/ POLISHING		Equipment QATM Qpol / Saphir Sample size \varnothing 40 mm				
STEP	MEDIUM		 rpm		 N	 min
 Planar grinding	GALAXY red	H ₂ O	250-300	▶▶ Synchronous rotation	30	Until plane
 Pre-polishing	BETA	Dia Complete Poly, 9 μ m	120-150	◀▶ Counter rotation	30	3:00-5:00
 Final polishing	IOTA	Dia Complete Poly, 3 μ m	120-150	◀▶ Counter rotation	30	3:00-4.00
 Optional: Etching (chemical)	Nital 3%					Approx. 0:03

PREPARATION METHOD













STAINLESS STEEL (AUSTENITIC/FERRITIC)

 CUTTING		Equipment QATM Qcut / Brillant	Consumables Cut-off wheel: corundum, resin bond Anti-corrosion coolant				
 MOUNTING		Equipment QATM Qpress / Opal	Consumables EPO black, EPO-Max, Bakelite red/black KEM 15 plus			Method Hot mounting Cold mounting	
 GRINDING/ POLISHING		Equipment QATM Qpol / Saphir Sample size \varnothing 40 mm					
STEP	MEDIUM		 rpm		 N	 min	
 Planar grinding	SiC-paper/foil P320 (280)	H ₂ O	250-300	▶▶ Synchronous rotation	30	Until plane	
 Pre-polishing	ALPHA/BETA	Dia Complete Poly, 9 μ m	120-150	◀▶ Counter rotation	35	5:00	
 Polishing	GAMMA/DELTA	Dia Complete Poly, 3 μ m	120-150	▶▶ Synchronous rotation	30	5:00	
 Final polishing	LAMBDA/OMEGA	Eposal, 0.06 μ m	120-150	▶▶ Synchronous rotation	20	1:00 (H ₂ O during final 0:30)	
 Optional: Etching (chemical)	V2A reagent*					Approx. 0:05-0:30	

* If etching doesn't work heat up (V2A) to 50 °C















PREPARATION METHOD

STEEL AND WELDED STEEL (MACRO)

 CUTTING		Equipment QATM Qcut / Brillant	Consumables Cut-off wheel: corundum, resin bond Anti-corrosion coolant				
 MOUNTING		Equipment QATM Qpress / Opal	Consumables EPO black, EPO-Max, Bakelite red/black KEM 15 plus			Method Hot mounting Cold mounting	
 GRINDING/ POLISHING		Equipment QATM Qpol / Saphir Sample size \varnothing 40 mm					
STEP	MEDIUM		 rpm		 N	 min	
 Planar grinding	SiC-paper/foil P180 (180)	H ₂ O	250-300	▶▶ Synchronous rotation	30	Until plane	
 Grinding	SiC-paper/foil P320 (280)	H ₂ O	250-300	◀▶ Counter rotation	25	1:00	
 Grinding	SiC-paper/foil P600 (400)	H ₂ O	250-300	◀▶ Counter rotation	25	1:00	
 Optional: etching (chem.)	Adler's reagent (macro)					Approx. 0.03-0:20	

PREPARATION METHOD













NITRIDED STEEL

 CUTTING		Equipment QATM Qcut / Brillant	Consumables Cut-off wheel: corundum, resin bond Anti-corrosion coolant				
 MOUNTING		Equipment QATM Qpress / Opal	Consumables EPO black, EPO-Max KEM 15 plus			Method Hot mounting* Cold mounting	
 GRINDING/ POLISHING		Equipment QATM Qpol / Saphir Sample size \varnothing 40 mm					
STEP	MEDIUM		 rpm		 N	 min	
 Planar grinding	GALAXY green SiC-paper/foil P320 (280)	H ₂ O	250-300	▶▶ Synchronous rotation	30	Until plane	
 Pre-polishing	ALPHA/BETA	Dia Complete Poly, 9 μ m	120-150	◀▶ Counter rotation	30	5:00	
 Polishing	GAMMA/DELTA	Dia Complete Poly, 3 μ m	120-150	▶▶ Synchronous rotation	30	6:00	
 Polishing	ZETA	Dia Complete Poly, 1 μ m	120-150	▶▶ Synchronous rotation	30	3:00	
 Final polishing	LAMBDA/OMEGA	Eposal, 0.06 μ m	120-150	◀▶ Counter rotation	15	2:00 (H ₂ O during final 0:30)	
 Optional: Etching (chemical)	Kalling II					Approx. 0:02-0:10	

* If necessary: Before hot mounting the sample should be wrapped in aluminum foil to stabilize the nitrided layer

PREPARATION METHOD















CERAMICS

 CUTTING		Equipment QATM Qcut / Brillant		Consumables Cut-off wheel: diamond, metal bond (bronze) Anti-corrosion coolant		
 MOUNTING		Equipment Vacuum		Consumables KEM 90 (porous material), KEM 35 (high-density, solid material)		Method Cold mounting
 GRINDING/ POLISHING		Equipment QATM Qpol / Saphir Sample size \varnothing 40 mm				
STEP	MEDIUM		 rpm		 N	 min
 Planar grinding	GALAXY red	H ₂ O	250-300	▶▶ Synchronous rotation	30	Until plane
 Grinding	GALAXY blue	H ₂ O	250-300	▶▶ Synchronous rotation	30	2:00
 Pre-polishing	BETA	Dia Complete Poly, 9 μ m + diamond paste	120-150	◀▶ Counter rotation	40	10:00
 Final polishing	GAMMA/DELTA	Dia Complete Poly, 3 μ m + diamond paste*	120-150	▶▶ Synchronous rotation	30	20:00

* Time and force might be divergent according to the sample size, disc size and material














PREPARATION METHOD

COBALT BASED ALLOY

 CUTTING		Equipment QATM Qcut / Brilliant	Consumables Cut-off wheel: corundum, resin or rubber bond Anti-corrosion coolant				
 MOUNTING		Equipment QATM Qpress / Opal	Consumables EPO black, EPO-Max KEM 15 plus			Method Hot mounting Cold mounting	
 GRINDING/ POLISHING		Equipment QATM Qpol / Saphir Sample size \varnothing 40 mm					
STEP	MEDIUM		 rpm		 N	 min	
 Planar grinding	SiC-paper/foil P320 (280)	H ₂ O	250-300	▶▶ Synchronous rotation	30	Until plane	
 Grinding	SiC-paper/foil P600 (400)	H ₂ O	250-300	▶▶ Synchronous rotation	30	1:00	
 Grinding	SiC-paper/foil P1200 (600)	H ₂ O	250-300	▶▶ Synchronous rotation	30	1:00	
 Polishing	SIGMA	Dia Complete Poly, 3 μ m	120-150	▶▶ Synchronous rotation	25	5:00	
 Final polishing	OMEGA	Eposal, 0.06 μ m	120-150	◀▶ Counter rotation	20	1:00 (H ₂ O during final 0:30)	
 Optional: Etching (chem.)	Nital 3%					Approx. 0:01-0:10	

PREPARATION METHOD



NICKEL BASED ALLOY












 CUTTING		Equipment QATM Qcut / Brillant		Consumables Cut-off wheel: corundum, resin or rubber bond Anti-corrosion coolant		
 MOUNTING		Equipment QATM Qpress / Opal		Consumables EPO black, EPO-Max KEM 15 plus		Method Hot mounting Cold mounting
 GRINDING/ POLISHING		Equipment QATM Qpol / Saphir Sample size \varnothing 40 mm				
STEP	MEDIUM		 rpm		 N	 min
 Planar grinding	GALAXY green	H ₂ O	250-300	▶▶ Synchronous rotation	35	Until plane
 Pre-polishing	BETA	Dia Complete Poly, 9 μ m	120-150	◀▶ Counter rotation	30	6:00
 Polishing	GAMMA/DELTA	Dia Complete Poly, 3 μ m	120-150	▶▶ Synchronous rotation	30	3:00
 Final polishing	LAMDA/OMEGA	Eposal, 0.06 μ m	120-150	◀▶ Counter rotation	20	1:30 (H ₂ O during final 0:30)
 Optional: Etching (chemical)	V2A reagent*					Approx. 0:05-0:30

* If etching doesn't work heat up (V2A) to 50 °C

PREPARATION METHOD

SPRAY COATINGS (METALLIC, CERAMIC)





















 CUTTING	Equipment QATM Qcut / Brillant	Consumables Cut-off wheel: diamond, resin bond Anti-corrosion coolant	
 MOUNTING	Equipment Vacuum	Consumables KEM 90	Method Cold mounting

 GRINDING/ POLISHING		Equipment QATM Qpol / Saphir Sample size \varnothing 40 mm					
STEP	MEDIUM		 rpm		 N	 min	
 Planar grinding	SiC-paper/foil P240 (180)	H ₂ O	250-300	▶▶ Synchronous rotation	30	Until plane	
 Grinding	SiC-paper/foil P800 (280)	H ₂ O	250-300	▶▶ Synchronous rotation	30	1:30	
 Pre-polishing	ALPHA/BETA	Dia Complete Poly, 9 μ m	120-150	◀▶ Counter rotation	25	5:00-8:00*	
 Polishing	DELTA	Dia Complete Poly, 3 μ m	120-150	▶▶ Synchronous rotation	30	5:00-8:00*	
 Final polishing	OMEGA	Eposal, 0.06 μ m	120-150	◀▶ Counter rotation	25	2:00 (H ₂ O during final 0:30)	

* Until homogeneous porosity → next polishing step

PREPARATION METHOD

MAGNESIUM BASED ALLOYS














 CUTTING		Equipment QATM Qcut / Brilliant	Consumable Cut-off wheel: diamond, resin bond Anti-corrosion coolant			
 MOUNTING		Equipment QATM Qpress / Opal	Consumable Bakelite red/black/green KEM 20	Method Hot mounting Cold mounting		
 GRINDING/ POLISHING		Equipment QATM Qpol / Saphir Sample size \varnothing 40 mm				
STEP	MEDIUM		 rpm		 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) 9 μ m, poly	120-150	▶▶ Synchronous rotation	15	5:00
 Polishing	SIGMA	 Diamond suspension (alcohol or oil based) 3 μ m, poly	120-150	▶▶ Synchronous rotation	15	5:00
 Polishing	ZETA	 Diamond suspension (alcohol or oil based) 1 μ m, poly	120-150	▶▶ Synchronous rotation	15	5:00
 Final polishing	OMEGA**	Etosil E, 0.06 μ m	120-150	◀▶ Counter rotation	25	4:00 (ethanol during final 0:30)
 Optional: Final polishing	OMEGA / Qpol Vibro	Etosil E, 0.06 μ m	120-150			20:00
 Optional: Etching (chemical)	Nital 3%					Approx. 0:03-0:10 (ethanol 0:30)

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

** Wet the polishing cloth with ethanol before polishing















PREPARATION METHOD

PRINTED CIRCUIT BOARD (NON ASSEMBLED)

 CUTTING		Equipment QATM Qcut / Brillant	Consumable Cut-off wheel: corundum, resin bond Anti-corrosion coolant				
 MOUNTING		Equipment Pressure unit	Consumable KEM 20			Method Cold mounting	
 GRINDING/ POLISHING		Equipment QATM Qpol / Saphir Sample size \varnothing 40 mm					
STEP	MEDIUM		 rpm		 N	 min	
 Planar grinding	SiC-paper/foil P180 (180)	H ₂ O	250-300	▶▶ Synchronous rotation	30	Until plane (slightly before point of interest)	
 Grinding	SiC-paper/foil P800 (500)	H ₂ O	250-300	▶▶ Synchronous rotation	25	1:00 (until point of interest)	
 Grinding	SiC-paper/foil P1200 (600)	H ₂ O	250-300	▶▶ Synchronous rotation	25	1:00 (until point of interest)	
 Polishing	GAMMA/DELTA	Dia Complete Poly, 3 μ m	120-150	▶▶ Synchronous rotation	30	3:00	
 Final polishing	OMEGA	Eposal, 0.06 μ m	120-150	◀▶ Counter rotation	25	2:00 (H ₂ O during final 0:30)	

PREPARATION METHOD














PRINTED CIRCUIT BOARD (ASSEMBLED)

 CUTTING		Equipment QATM Qcut / Brillant	Consumable Cut-off wheel: diamond, metal bond Anti-corrosion coolant				
 MOUNTING		Equipment Pressure vessel	Consumable KEM 20, KEM 90			Method Cold mounting	
 GRINDING/ POLISHING		Equipment QATM Qpol / Saphir Sample size \varnothing 40 mm					
STEP	MEDIUM		 rpm		 N	 min	
 Planar grinding	SiC-paper/foil P320 (180), GALAXY green*	H ₂ O	250-300	▶▶ Synchronous rotation	30	Until plane (slightly before point of interest)	
 Grinding	SiC-paper/foil P600 (400), GALAXY blue*	H ₂ O	250-300	▶▶ Synchronous rotation	25	1:00 (until point of interest)	
 Grinding	SiC-paper/foil P1200 (600), GALAXY yellow*	H ₂ O	250-300	▶▶ Synchronous rotation	25	1:00 (until point of interest)	
 Pre-polishing	ALPHA/BETA	Dia Complete Poly, 9 μ m	120-150	◀▶ Counter rotation	25	4:00	
 Polishing	GAMMA/DELTA	Dia Complete Poly, 3 μ m	120-150	▶▶ Synchronous rotation	30	4:00	
 Final polishing	ZETA/OMEGA	Eposal, 0.06 μ m	120-150	◀▶ Counter rotation	25	1:30 (H ₂ O during final 0:30)	

* For printed circuit boards with ceramic components

PREPARATION METHOD

COPPER AND COPPER BASED ALLOYS











 CUTTING		Equipment QATM Qcut / Brillant	Consumable Cut-off wheel: corundum, resin bond Anti-corrosion coolant				
 MOUNTING		Equipment QATM Qpress / Opal	Consumable Bakelite red/black, Thermoplast KEM 20, KEM 30 Hot mounting preferred			Method Hot mounting Cold mounting	
 GRINDING/ POLISHING		Equipment QATM Qpol / Saphir Sample size \varnothing 40 mm					
STEP	MEDIUM		 rpm		 N	 min	
 Planar grinding	SiC-paper/foil P320 (280)	H ₂ O	250-300	▶▶ Synchronous rotation	30	Until plane	
 Pre-polishing	BETA	Dia Complete Poly, 9 μ m	120-150	▶▶ Synchronous rotation	30	3:00-4:00	
 Polishing	SIGMA	Dia Complete Poly, 3 μ m	120-150	▶▶ Synchronous rotation	30	3:00-4:00	
 Final polishing	OMEGA	Eposil F, 0.1 μ m*	120-150	◀▶ Counter rotation	15	1:00-2:00* (H ₂ O during final 0:30)	
 Optional: Etching (chemical)	Cu Etchant A (chloride version)					Approx. 0:02	

* 50 ml Eposil F + 1 ml H₂O₂ + 1 ml NH₃, otherwise polishing time x2

PREPARATION METHOD

TITANIUM (COMMERCIAL PURE: GRADE 1-4)

 CUTTING	Equipment QATM Qcut / Brillant	Consumable Cut-off wheel: silicon carbide, resin bond Anti-corrosion coolant	
 MOUNTING	Equipment QATM Qpress / Opal	Consumable EPO black, EPO-Max KEM 20, KEM 15 plus	Method Hot mounting Cold mounting














 GRINDING/ POLISHING	Equipment QATM Qpol / Saphir Sample size \varnothing 40 mm	STEP	MEDIUM	 H_2O	 rpm		 N	 min
 Planar grinding	SiC-paper/foil P320 (280)			H_2O	250-300	▶▶ Synchronous rotation	25	Until plane
 Pre-polishing	ALPHA/BETA			Dia Complete Poly, 9 μ m	120-150	◀▶ Counter rotation	30	10:00
 Final polishing	LAMBDA			Eposil F, 0.1 μ m*	120-150	◀▶ Counter rotation	40	10:00-15:00** (H_2O during final 0:30)
 Optional: Etching (chemical)	Kroll's reagent							Approx. 0:45

* Eposil F has to be mixed with hydrogen peroxide (35%) in a ratio of 5:1 (safety advice: use personal protective equipment)

** Depends on grade of titanium

PREPARATION METHOD

TITANIUM BASED ALLOY

 CUTTING		Equipment QATM Qcut / Brilliant	Consumable Cut-off wheel: silicon carbide, resin bond Anti-corrosion coolant				
 MOUNTING		Equipment QATM Qpress / Opal	Consumable EPO black, EPO-Max KEM 20, KEM 15 plus			Method Hot mounting Cold mounting	
 GRINDING/ POLISHING		Equipment QATM Qpol / Saphir Sample size \varnothing 40 mm					
STEP	MEDIUM		 rpm		 N	 min	
 Planar grinding	SiC-paper/foil P320 (280)	H ₂ O	250-300	▶▶ Synchronous rotation	25	Until plane	
 Grinding	SiC-paper/foil P600 (400)	H ₂ O	250-300	▶▶ Synchronous rotation	25	1:30	
 Pre-polishing	ALPHA/BETA	Dia Complete Poly, 9 μ m	120-150	◀▶ Counter rotation	30	5:00	
 Final polishing	OMEGA	Eposil F, 0.1 μ m*	120-150	◀▶ Counter rotation	40	8:00-10:00** (H ₂ O during final 0:30)	
 Optional: Etching (chemical)	Kroll's reagent					Approx. 0:45-0:55	

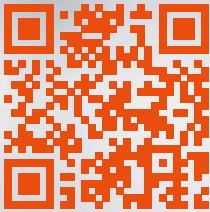
* Eposil F has to be mixed with hydrogen peroxide (35%) in a ratio of 5:1 (safety advice: use personal protective equipment)

** Depends on the alloy

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