

**TYROLIT - YOUR PARTNER
IN MEDICAL TECHNOLOGY**
TOOLS FOR UNIVERSAL GRINDING
AND CUTTING APPLICATIONS

A Company of the SWAROVSKI Group
www.tyrolit.com

TYROLIT

TYROLIT Group A global company

As one of the world's leading manufacturers of bonded grinding, cutting, sawing, drilling and dressing tools as well as a system supplier of tools and machines for the construction industry, the family-run company TYROLIT has been synonymous with top quality products, innovative spirit and outstanding service since 1919.

Day in, day out, the experts at TYROLIT work on delivering tailor-made solutions for customers around the world, helping to make their businesses successful. Around 80,000 available products set the standards in a wide variety of industries.



TYROLIT company headquarters in Schwaz, Austria

TYROLIT business units



Metal / Precision

From precision machining in the engine and gearbox industry to the production of cut-off wheels with diameters up to 2,000 mm for the steel industry – the TYROLIT product range in the Metal & Precision business unit includes high-tech tools for a wide variety of applications.



Trade

Thanks to its global sales network, in addition to premium product solutions in the three core areas of cutting, grinding and surface treatment, the trade business unit of TYROLIT guarantees truly customer-focused marketing support.



Construction

In the Construction business unit, TYROLIT is a leading system supplier of drilling systems, wall and wire saws, floor saws and tools for the surface grinding of concrete motorways.



Stone – Ceramics – Glass

Our tailored diamond tools and grinding solutions in the Stone – Ceramics – Glass business unit impress through their exceptional performance and quality.

A competent partner in medical technology

The demands in terms of quality and economic efficiency are continuously rising in the medical technology industry. This in turn means that grinding tools also have to meet higher requirements. TYROLIT has long-standing experience and a high level of expertise in grinding solutions for use in medical technology.

With the current product range, we are therefore able to offer our customers particularly high-quality products for numerous grinding cutting and polishing applications. Furthermore, TYROLIT tools guarantee optimum processes, higher productivity as well as absolute product safety.

Our services for the medical technology industry at a glance

Innovative products

Application technology

Global presence

Customised solutions



Global presence In your vicinity

Global presence

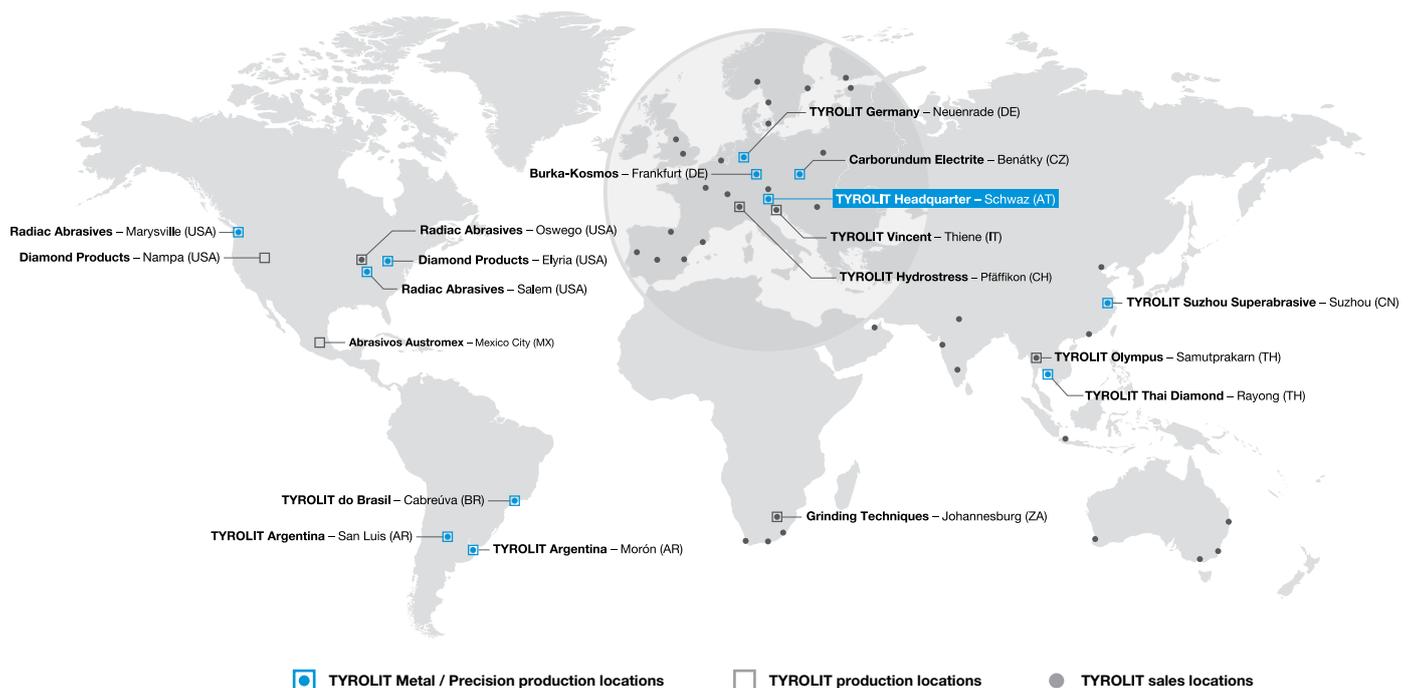
TYROLIT stands for global thinking and activities. With a worldwide sales network currently in 65 countries and with our own production plants in 12 countries on five continents, we offer our customers all the advantages of a globally operating company.

Local availability

Global thinking, local action – in your national language and in your vicinity. This is the principle we follow in dealing with our customers. Local contacts near your premises and a global team of specialist application engineers ensure optimum customer support and first-class service.

Your benefits

- + Global presence with local contacts
- + Short response and service times



Application technology

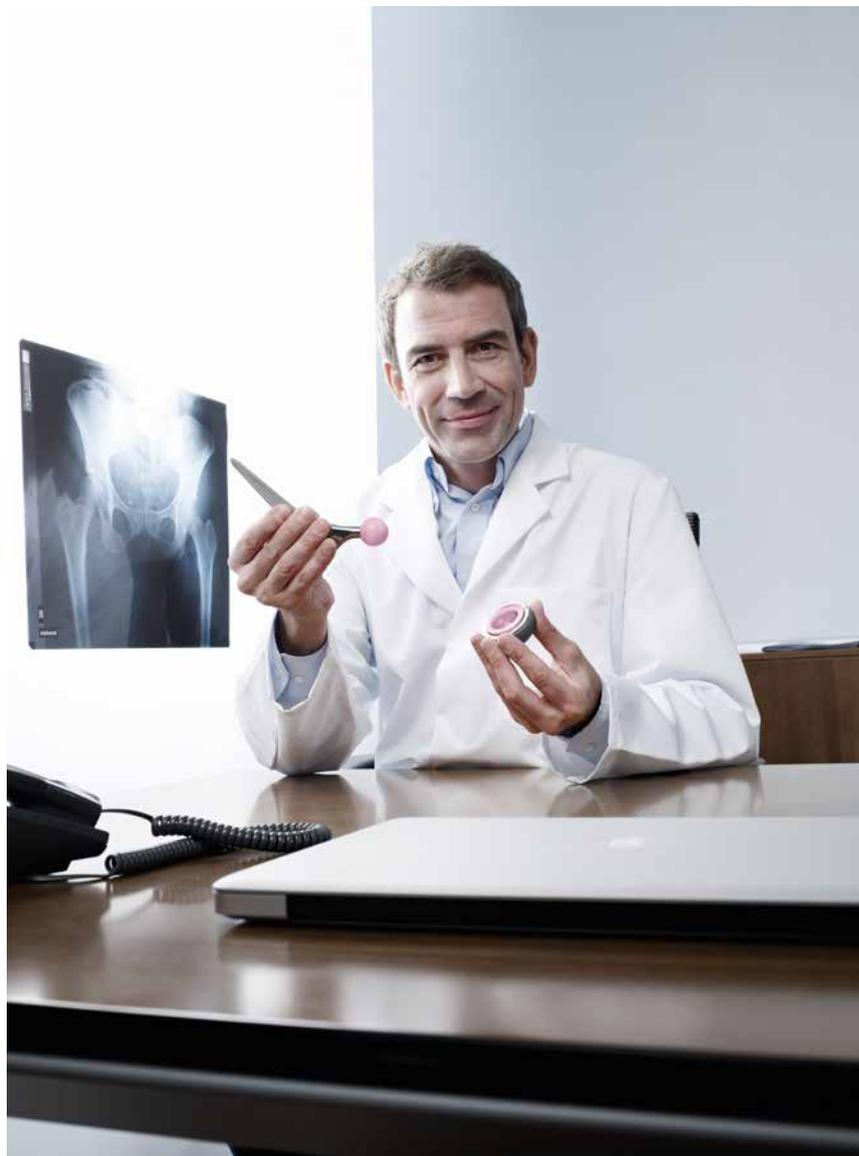
The best grinding solutions for your processes

Expertise in cutting and grinding – this has characterised TYROLIT for nearly one hundred years. With the wealth of process expertise commanded by our specialist application engineers, we are able to provide our customers with sustained solutions in line with their demanding technical and economic expectations.

Our global team of specialist application engineers defines solution proposals individually tailored to your requirements. In many years of cooperation with end users and machine manufacturers, numerous grinding processes have been further developed to the highest level.

Your benefits

- + The global presence of our application engineers
- + Process solutions and optimisation for individual tasks
- + Cooperation with established machine manufacturers
- + Internal and external seminars and training courses



Innovative products for machining medical workpieces

Based on the requirements of its medical technology customers, continuously TYROLIT produces new, high-quality and particularly cost-efficient products. All the development activities are conducted in close co-operation with machine manufacturers and universities. With numerous innovative products and solutions, TYROLIT has been successful on the medical technology market for many years.

ELASTIC fine grinding and polishing tools: TYROLIT has been producing elastic-bonded grinding tools since 1985. These products have been continuously improved and the increasing requirements in terms of surface finish and design adapted.



Diamond ceramic abrasive layer for honing sleeves with low metal support: The specially developed tool design and the innovative grinding layer enable longer tool life, particularly for the machining of hip joints.



Core for diamond and CBN grinding tools with high damping effect: Through the weight reduction owing to the CF core used, tool lifetimes have been increased by up to 25 percent while maintaining the same surface finish



Modern implant technology Developed for people

The growing demand on the part of the general public for health in old age requires a growing number of surgical operations and treatments.

Owing to longer life expectancy, in conjunction with the desire for greater mobility in old age, the demand for surgical implants is ever increasing. Additionally increasing affluence and the ensuing increase in obesity results in a premature need for joint implants.

Worldwide orthopaedic product sales volume: 2011: US\$ 43,1 billion
2015: US\$ 46,6 billion

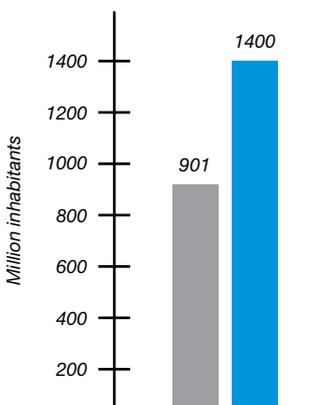
Source: Orthoworld

Implant technology – growth factors

The number of people over 60 will increase worldwide to approx. 1.4 billion until 2030. Life expectancy will increase by ca. 10% until 2030.

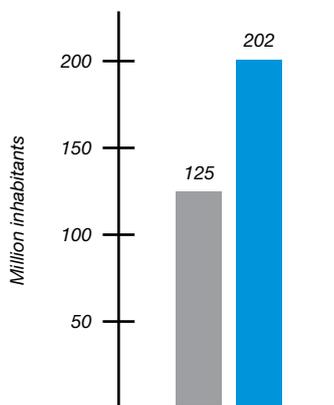
Population aged over 60 years

Worldwide ■ 2015 ■ 2030



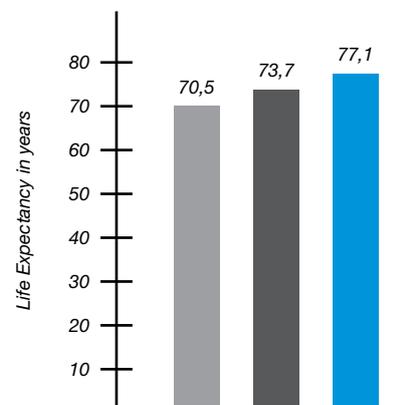
Population aged over 80 years

Worldwide ■ 2015 ■ 2030



Life Expectancy

Worldwide ■ 2015 ■ 2030 ■ 2050



Source: OECD Indicators

Customer-specific solutions Tailored for your industry

In medical technology, in particular for the machining of ceramic hip joints and stainless steel knee joints, customers demand the highest standards with regard to the quality of the tools produced.

In order to ensure the best possible solution for your application, TYROLIT offers individually developed products for numerous different fields of

application. An overview of the available grinding tools for machining a variety of implants and tools used in medical technology. Please see

the following pages for detailed descriptions of these tools as well as their respective fields of application (including stock availability).

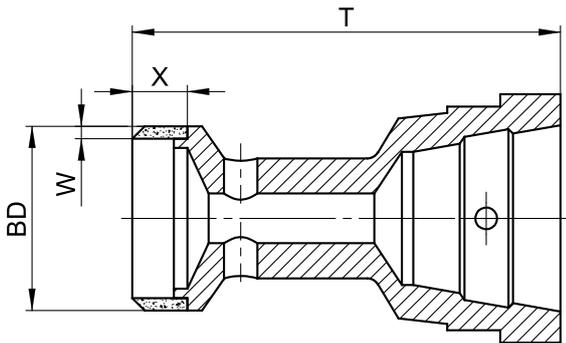
Medical technology product	Application	Our product recommendation
Ceramic hip joint	Pre fine grinding	DIAMOND GRINDING TOOL
Steel hip joint	Pre-fine grinding and polishing	CBN DIAMOND AND SIC GRINDING TOOLS
Steel knee joint	Pre and fine grinding	CERAMIC AND ELASTIC GRINDING TOOLS
Titanium bone splints	Deburring and ultrafine grinding	ELASTIC FINE GRINDING TOOLS
Hypodermic needles	Point grinding	BY GRINDING TOOLS
Hypodermic needles	Cutting	R-BOND CUT-OFF WHEELS
Scalpels	Grinding, sharpening and polishing	COOL-CUT GRINDING TOOLS
Medical scissors	Grinding	COOL-CUT GRINDING TOOLS
Tweezers	Effect grinding	ELASTIC GRINDING TOOLS
Medical technology instruments	Ultrafine grinding	ELASTIC GRINDING TOOLS
Bone drill	Grinding	CBN GRINDING TOOLS
Cold chisel	Grinding	CBN GRINDING TOOLS
Dental drill and cutter	Grinding	CBN GRINDING TOOLS
Dental root drill	Grinding	DIAMOND GRINDING TOOLS

A photograph of an industrial grinding machine in a factory. The machine is made of stainless steel and blue metal. It has several large, cylindrical abrasive wheels mounted on a blue metal frame. The wheels are arranged in a row on a blue metal table. In the background, there are more industrial components, including pipes and a red panel with a yellow label that says "Abrasi METAL METAL 67-01". The overall scene is a clean, well-lit industrial environment.

Grinding tools for medical technology

DIAMOND GRINDING TOOLS

For ceramic insert cups



Shape 2F7M



STANDARD DIMENSIONS

Shape	BD	W	X	T	Specification	Comments
2F7M	20.5	2.75	9	78	D35L8VD46ST	Diamond, ceramic bonded
2F7M	24.0	3	9	78	D35L8VD46ST	
2F7M	29.2	2.6	9	78	D35L8VD46ST	
2F7M	38.1	3	9	78	D35L8VD46ST	



Machine manufacturer:

+ Monnier & Zahner, Thielenhaus

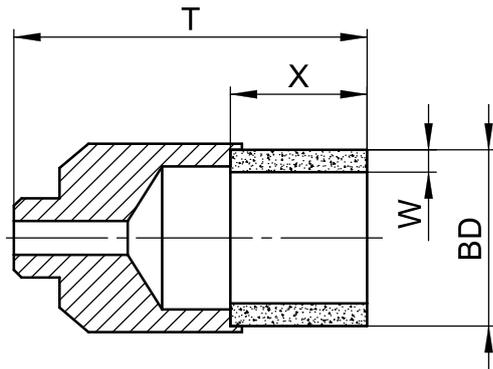
Other:

+ Other dimensions and specifications on request

+ Wet grinding (oil)

DIAMOND GRINDING TOOLS

For ceramic-heads (hip joints)



Shape 2M7



STANDARD DIMENSIONS

Shape	BD	W	X	T	Pre-grinding	Fine grinding	Polishing	Comments
2M7	16.3	1.6	6	20	D 126 - V/M			Diamond, ceramic or metal bonded
2M7	21.0	3	8	33		D 35L8VD46		Diamond, ceramic bonded
2M7	30.6	5.3	12	85			D 0.5 - 2 B	Diamond, resin bonded



Machine manufacturer:

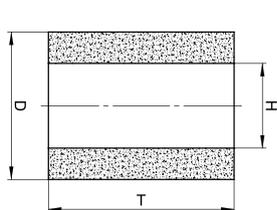
- + Monnier & Zahner, Thielenhaus

Other:

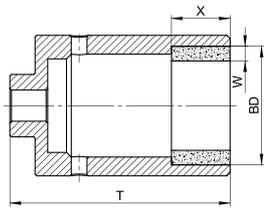
- + Indicated specifications available for all dimensions.
- + Other dimensions and specifications on request
- + Wet grinding (oil)

CBN/DIA AND SIC-GRINDING TOOLS

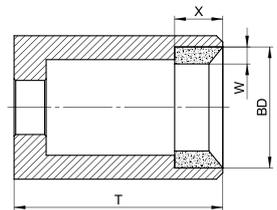
For metal-head (hip joint)



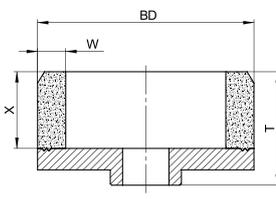
Shape 5420



Shape 2A7H



Shape 2M7



Shape 3M2



STANDARD DIMENSIONS

Shape	D	T	H	Pre-grinding	Fine grinding	Polishing	Comments	
5420	27	14	12					
	32	20	20					
	38	20	32	C320-85V83T3	C800-45V83T3	36A800F5B9	Pre-grinding and fine grinding: SIC, ceramic bonded	
	45	20	32	C600-45V18T3	C1200-45V83T3	36A1000H5B9		
	55	20	30				Polishing: Resin-bonded	
	65	20	30					
Shape	BD	W	X	T	Pre-grinding	Fine grinding	Polishing	Comments
2A10	23.3	30	2.1	15	B126C100B54AL			CBN, resin-bonded
2A7H	37.5	50	3.3	15		B91L8VD49AL		CBN, ceramic bonded
2M7	40	50	4	15	B107C100B54AL	B91C100B54AL		CBN, resin-bonded
3M2	33	20	5	12	B126C100B54AL	B46C100B54AL	D5C50B60AL	CBN/diamond, resin bonded

Machine manufacturer:

- + Monnier & Zahner, Thielenhaus

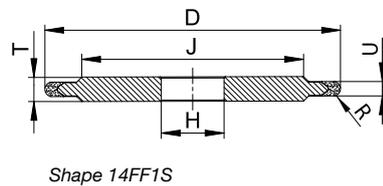
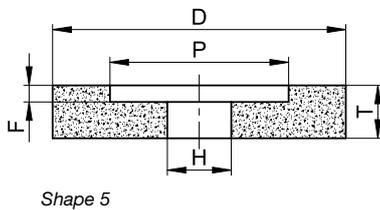
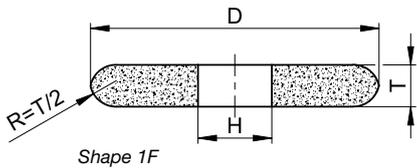
Other:

- + Other dimensions and specifications on request
- + Wet grinding (emulsion)



CERAMIC AND ELASTIC GRINDING TOOLS

For metal knee joints



STANDARD DIMENSIONS

Shape	D	T	H	Pre-grinding	Fine grinding	Polishing	Comments
14FF1S	240	20	51	B91 R37 V390CF/160			CBN vitrified-bonded
1F	250	15	51	SU33A60HH11VB1	SU65A80I10VB1		Conventional vitrified bonded
5	400	60	127	SU83A54I19VK8	SU85A80J9VK8		Conventional vitrified bonded
1F	200	20	32		C150-BE13TF		
1F	200	20	32			C240-BE12	Elastic-bonded
1F	200	20	32			C400-BE12	

Machine manufacturer:

- + Schütte, Haas, Hermle, Makino

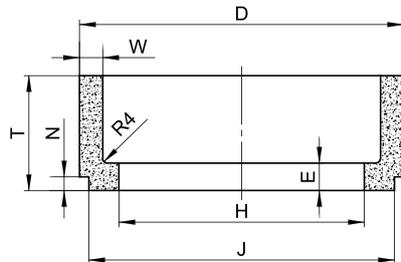
Other:

- + Specifications for machining of ceramic knee joints on request
- + Other dimensions and specifications on request
- + Wet grinding, oil or emulsion



COOL - CUT GRINDING TOOLS

For scalpel machining



Shape 6



GRINDING (WET GRINDING)

Shape	D	T	H	W	J	E	N	Specification	Vmax
6 - 1112F	200	90	150	6	188	17	6		
6 - 1112A	200	90	150	8	188	17	6		
6 - 1112C	200	90	150	10	188	15	6	91A150R14BD800	40 m/s
6 - 1112B	200	90	150	15	188	15	6		
6 - 1112E	200	90	150	20	188	22	6		

SHARPENING (WET GRINDING)

Shape	D	T	H	Specification	Vmax	Type number
1	150	6	16	89A120P6BY40	32 m/s	532312

POLISHING (WET AND DRY GRINDING)

Shape	D	T	H	Specification	Vmax	Type number
1	150	20	20	C80 - BE15	25 m/s	7186*
	150	20	20	C150 - BE15	25 m/s	2661*
	200	25	20	C240 - BE15	25 m/s	320369*
	200	25	32	C400 - BE15	25 m/s	22411*
	150	20	20	C400 - BE16	32 m/s	71212*
	150	20	20	C800 - BE11	25 m/s	669110*
	175	20	32	C800 - BE11	25 m/s	669109*

Machine manufacturer:

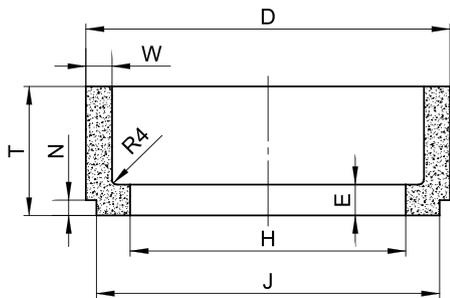
+ Berger, Siepmann



* Stock Items

COOL - CUT GRINDING TOOLS

For scissor machining



Shape 6



STANDARD DIMENSIONS

Shape	D	T	H	W	J	E	N
6 - 1112G	200	90	150	4	188	17	6
6 - 1112D	200	90	150	5	188	17	6
6 - 1112F	200	90	150	6	188	17	6
6 - 1112A	200	90	150	8	188	17	6
6 - 1112C	200	90	150	10	188	15	6
6 - 1112B	200	90	150	15	188	15	6
6 - 1112E	200	90	150	20	188	22	6
6 - 1302B	200	110	150	5	188	17	6
6 - 1302A	200	110	150	8	188	17	6
6 - 1302C	200	110	150	20	188	22	6
6 - 1223B	200	120	140	15	190	20	6

Machine manufacturer:

- + Berger, Siepmann

Other:

- + Only for wet grinding at max. 40 m/s
- + No dressing required



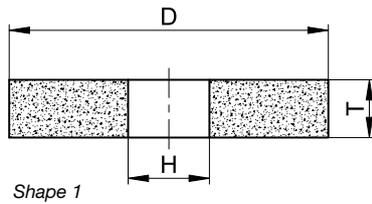
Recommended specification

Easy cutting	Standard	Comments
89A120 R14 BD780	91A150R14BD800	Resin bonded

* Stock Items

ELASTIC GRINDING TOOLS

Fine implants (splints & plates)



STANDARD DIMENSIONS

Shape	D	T	H	Specification	Vmax	Properties
1	150	20	20	C46 - BE12	20	Very soft
	150	20	20	C80 - BE13	16	Soft
	150	20	20	C150 - BE14	20	Medium
	150	20	20	C240 - BE15	25	Medium-hard
	150	20	20	C400 - BE16	32	Hard

Grit size recommendation

Listed grit sizes available in all bonds (BE12 - BE16).	C46	Deburring
	C80	Matting
	C150	Fine grinding
	C240	Ultra-fine grinding
	C400	Pre-polishing

Application:

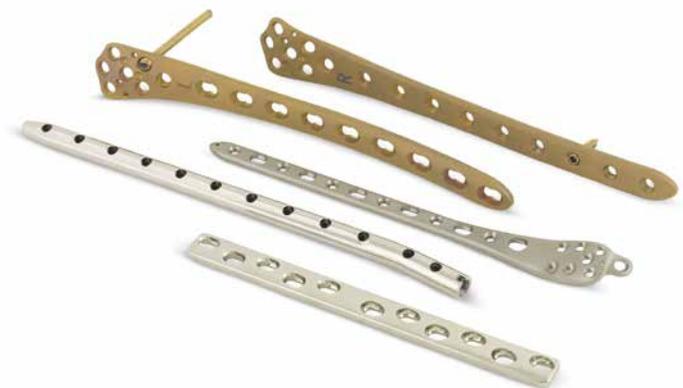
- + Fine grinding and polishing of all kinds of implants and bone splints

Machine types:

- + Handheld and stationary machines

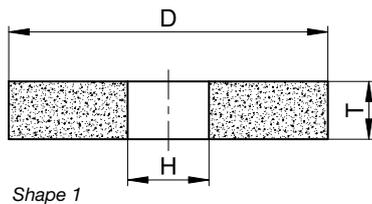
Other:

- + Dry grinding
- + No dressing required, profiling of the wheel is possible by using a dressing stick in ceramic bond.
- + 50x20x150, 50C24H10V15, TN545066.
50x20x150, C coarse, TN 9009 (ex stock)



ELASTIC GRINDING TOOLS

For surgical instruments (tweezers, forceps, clamps)



STANDARD DIMENSIONS

Shape	D	T	H	Specification	V _{max}	Properties
1	100	5	25	A80 - BD-W	20	Soft
	125	8	25	A150 - BD-M	25	Medium
	150	10	25	A240 - BD-H	32	Hard

Grit size recommendation

A46, A80	Pre-grinding
A150, A240	Semi-finish grinding
A400, A600	Fine grinding
A800	Pre-polishing
A1200	Polishing

Application:

- + Elastic grinding tools for fine grinding, matting and polishing of surgical instruments

Machine types:

- + Handheld and stationary machines

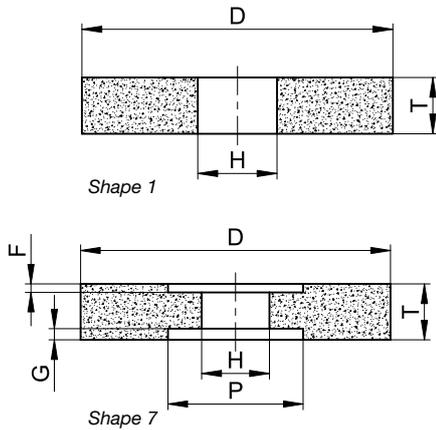
Other:

- + Predominantly dry grinding,
- + No dressing required, profiling of the wheel is possible by using a dressing stick in ceramic bond



GRINDING AND CUT-OFF TOOLS

For hypodermic needles



STANDARD DIMENSIONS

Shape	D	T	H	P x F/G
1	450	40	127	
	455	76	127	
	455	80	127	
	455	100	203.2	
	457	129	127	
	406	127	127	
	406	102	203.2	
	406	150	203.2	
	356	102	203.2	
	300	129	127	
	508	203	304.8	
7	508	102	203.2	280 x 21/21

Recommended specification

	Standard	Long life
Needles	C500 J6 BY34	C500 K6 BY35/50
Lancets	C500 J6 BY34	C600 K6 BY34/50

Grinding hypodermic needles

Machine manufacturer:

- + Tacchella, Justur

Peripheral speed:

- + $V_s = 32 - 50$ m/s

Other:

- + For wet grinding only
- + No dressing required

Cutting of needles clamped in packets

Cut-off wheel shape: 41N

Dimensions:

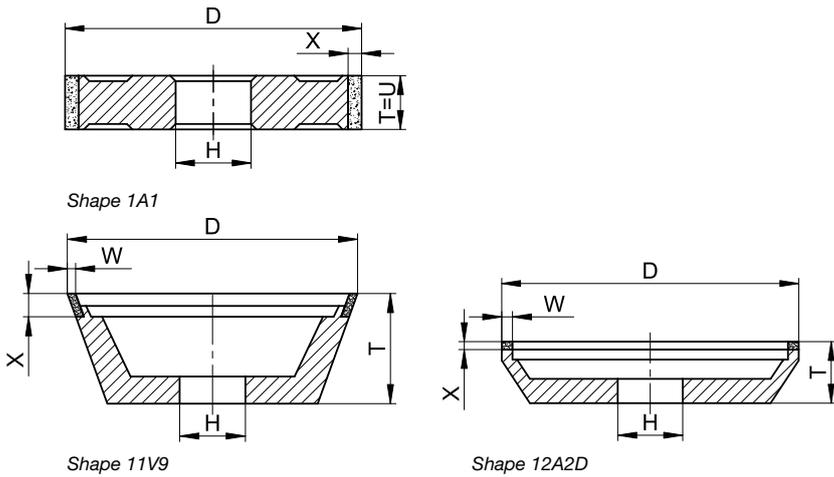
- + z.B. 180 x 0.6 x 25.4

Specification:

- + z.B. A320 - R707 | For wet grinding only
- + Other dimensions and specifications on request

CBN GRINDING TOOLS

For medical tools such as bone drills, threaded pins, flat chisels, dental drills and cutters



MACHINING RECOMMENDATIONS

Shape	D	T	H	U/W	X	Specification	Type number	Comments
1A1	100	6	20	6	10	B107-4-MXPP	34230222	HSS tools (flute and face surface grinding)
	100	10	20	10	10		34185752	
	125	6	20	6	10		34230226	
	125	10	20	10	10		34227454	
11V9	75	30	20	3	10	B107-BXPP	34211869*	Cold chisels
	100	35	20	3	10		34205432*	
	125	40	20	3	10		34184813*	Bone drills
12A2D	75	22	20	3	3	B126-B54	206511	Dental drills and cutters
						B54-B54	206513	
						B30-B54	770469	
						B15-B54	770467	

Machine manufacturer:

- + Rollomatic, Anca, Walter, Schütte, Haas, EWAG

Other:

- + Wet grinding with oil and/or emulsion
- + Other dimensions and specifications on request



* Stock Items

TYROLIT SCHLEIFMITTELWERKE SWAROVSKI K.G.

Swarovskistrasse 33 | 6130 Schwaz | Austria

Tel. +43 5242 606-0 | Fax +43 5242 63398

All **worldwide subsidiary companies** can be found on our website at www.tyrolit.com



Like us on Facebook
facebook.com/TYROLIT