

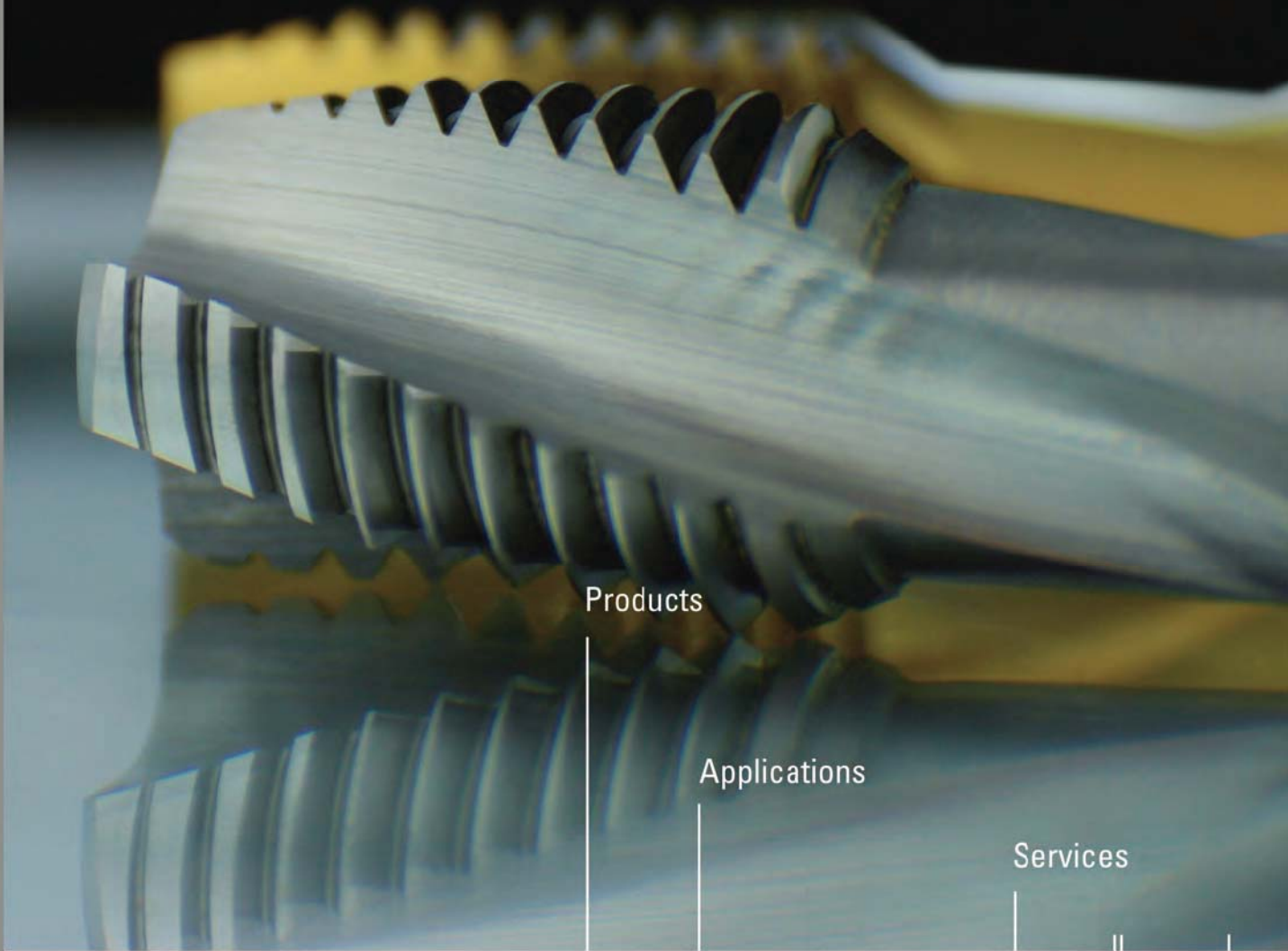
SCHUMACHER

PRECISION TOOLS SINCE 1918



JIS - edition

Schumacher Precision Tools GmbH



Products

Applications

Services





## The Enterprise

## Networks & cooperations – worldwide





## The Enterprise

### Precision Tools since 1918

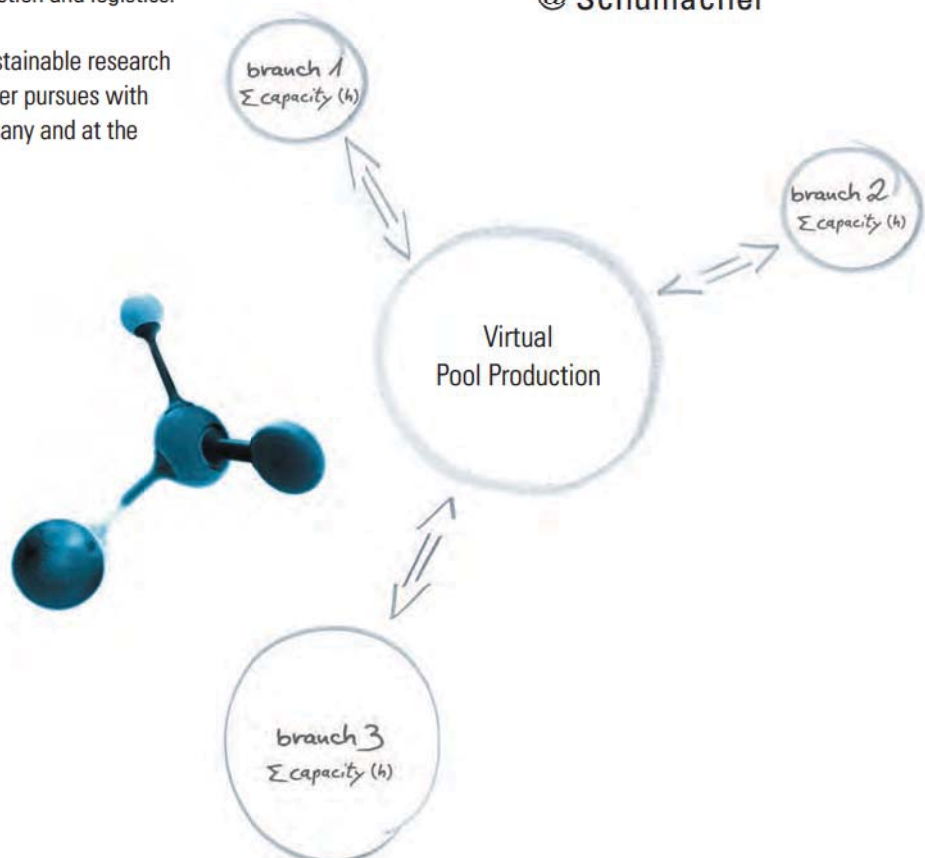
Schumacher has been producing high end cutting tools for more than 90 years.

In addition to high end products, our customers expect an array of flexible services in the sectors application-oriented R&D, stock management, logistics, and after-sales support. In a market dominated by international competition, however, such services can only be provided on a sustainable basis if built upon an excellent cost base.

The continuous and transparent flow of information and the transaction of all processes through clearly-defined interfaces with all partners represent some of the main prerequisites in this context. This framework has led our company to develop from a traditional tool factory into a service-based producer with an international network of R&D, production and logistics.

This development has been supported by sustainable research and development activities which Schumacher pursues with several prestigious universities both in Germany and at the international level.

### Network Production @ Schumacher



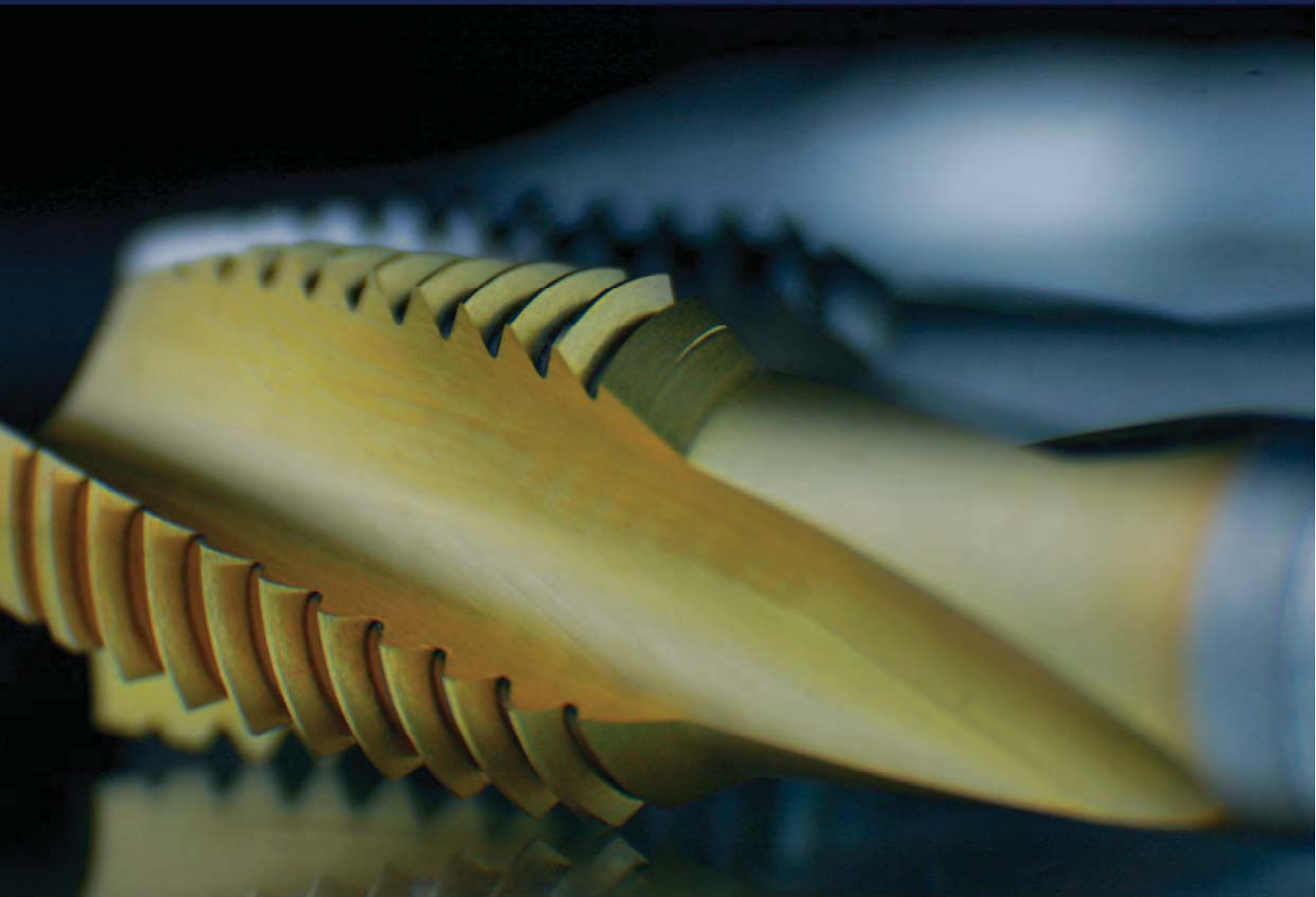




## The Schumacher Principle

The Schumacher principle comprises services such as:

- Development and production of high end cutting tools
- Standardization
- On-demand research and development
- Tool life tests and comparative assessments
- Technical training and seminars for your staff
- Disposition and stock management







Design for Tool Performance

In the field of R&D for high performance tools, Schumacher can draw upon an internal standardized product data base containing more than 20,000 tool types. This technological basis supports the construction of tools – such as for our ‘rapid prototyping’ – and facilitates the CAD variant construction.

An external network of reputable institutions supports Schumacher when it comes to high speed steels and full metal substrates, heat and surface treatments as well as hard coatings.



**Hard Steel**  
by Schumacher

**High Speed Cutting**  
by Schumacher

Product line designed for hard steel tooling

Product line with newly developed hard coatings and geometries for high speed cutting (HSC / HPC)



## Product Technology

### High End Solutions

Schumacher service engineers ensure an optimum performance with a carefully-tailored tool design (substrate, geometry, hard coating), exact parameters for the use of the tools and a continuous controlling process regarding the environment in which the tool is used.

Key objectives for the work processes include:

- + Increase of cutting speeds
- + Increase of tool life
- + Reduction of tool replacement costs
- + Increase of application range in each tool group



PM-Line   
by Schumacher

Product line from various PM-substrates  
designed for high end applications

Example:  
PM-Line Typhoon Series





## Core Competences

### Research & Development

Management tools developed jointly by Schumacher and Aachen University serve as a backbone for an integrated processing of information in our company.

Data base-oriented product design combined with DP-based systems of production and logistics guarantee the professional character requested by sophisticated customers. This holds true both for the production of tools and for online services – such as providing data on technology and logistics according to our customer requirements.

Our management tool 'network production' introduces modern networking structures to manufactures – an advance in know-how which has enabled us to provide consultant services to many companies in the precision tool industry.

### RWTH Aachen University

## Successful cooperation with prestigious universities

Flexible on-demand R&D in tool technology and development of management tools for small and medium-sized enterprises (SME)

**Research & Development**  
by Schumacher







## Core Competences

### High Volume b-to-b for professionals

Schumacher holds an extensive program of tools in stock with more than 25,000 different tool types.

Tool design, labeling, and packing are provided from one source – carefully-tailored to the specific requirements of our b-to-b customers – including a stock management with a guaranteed 99% availability.

High Volume   
by Schumacher





## Core Competences

### Carbide Technology

Based on the Schumacher technology data network, a partnership project with industry end users has enabled us to significantly increase cutting speeds, raise tool life and improve the thread's overall quality through the employment of newly-developed solid carbide taps as well as solid carbide forming taps.

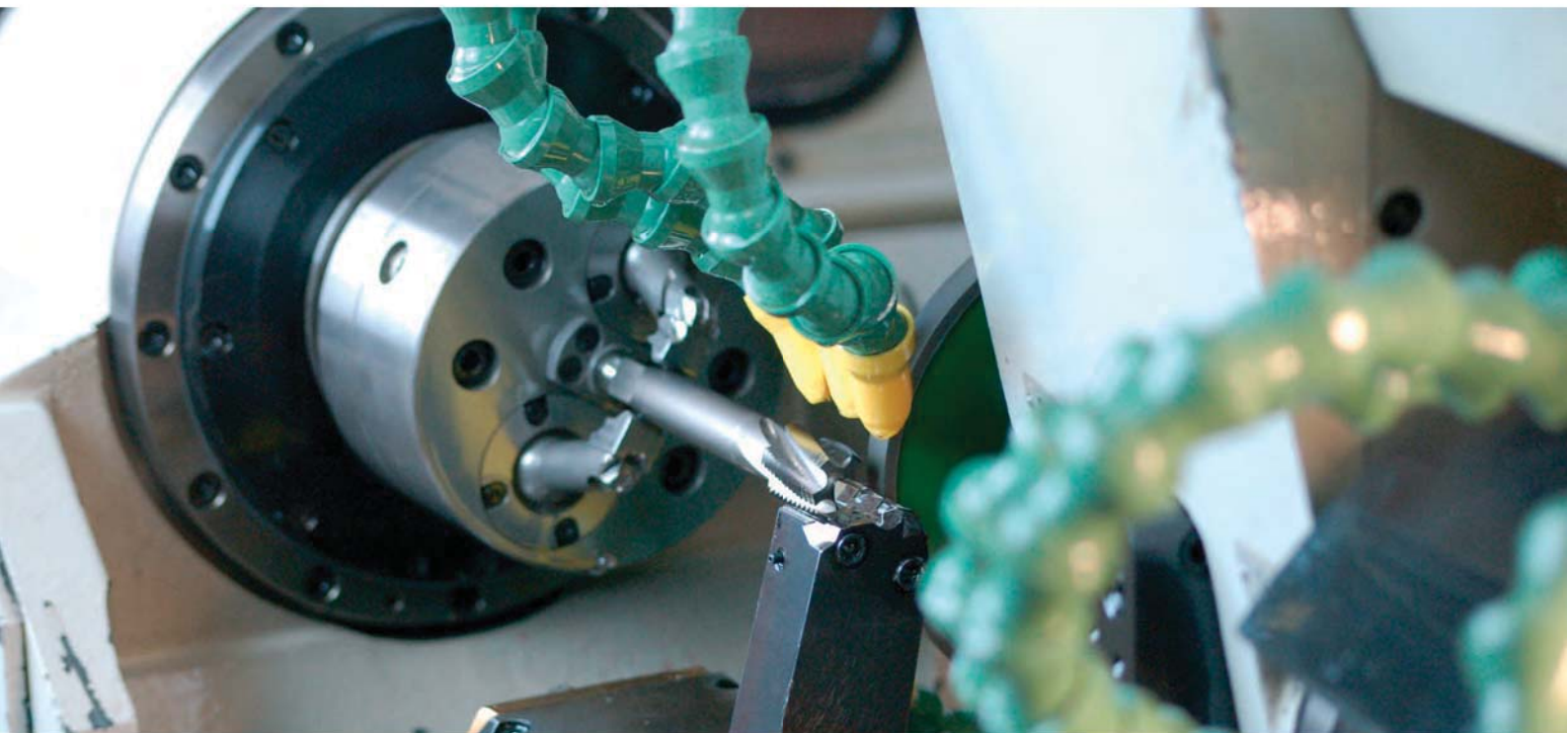
In close cooperation with the substrate producers, our precision tools are specifically adapted to the broad variety of production techniques in engine construction.

These new solid carbide taps are meanwhile employed under various clamping conditions and both in CNC-Machines as well as in transfer streets with automatic chucking machines.

Hence, this solid carbide technology has successfully replaced previous high speed steel taps in these applications.



Product line made of solid carbide – with internal coolant supply







## Special Solutions

### Market-oriented Schumacher pricing for an excellent cost base

Innovative and competitive industries require short reply times for the pricing of special tools. Schumacher applies management tools which support the most efficient use of the factors time and cost.

Moreover, our after-sales service has turned out to be a deciding factor for customer satisfaction in specialized industries. Our methods of communication have proven to be essential for Schumacher's competitive edge.



The 'Schumacher principle' for special tools:

Production logistic system with blanks available in all common versions – also at hand for the 5 Days Speed Service  
Remark: For Europe countries only







## Products and Services

The Enterprise		1.1 - 1.9
Metric Coarse Thread	M	1 - 19
Metric Fine Thread	MF	20-31
Unified Coarse Thread ANSI B1.1	UNC	32-35
Unified Fine Thread ANSI B1.1	UNF	36-39
Whitworth Pipe Thread DIN ISO 228	PF	40-41
British Standard Tapped Pipe Thread DIN EN 10226-2, ISO 7-1	BSPT	42
American Tapered Pipe Thread ANSI B 1.20.1	NPT	43-44
Technology		7.1
Color Rings		7.2
Cutting Speeds		7.3
Chamfer Length		7.4
Surface		7.5
Tolerance		7.6
Material Groups		7.7 - 7.10

Remarks:

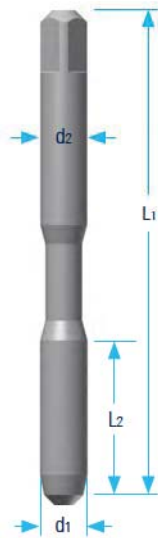
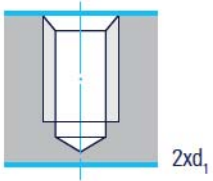
1. "SL" - Sackloch is a German language which means blind holes.  
"DL" - Durchgangslot is a German language which means through holes.
2. Actual thread length for M2 to M6 maybe different from the specification listed on the catalogue.



Under development  
Spiral Fluted Taps  
No Ring

JIS  
HSS-E/V3  
RH spiral flutes 40°  
for universal use

Group C30A  
for blind holes



Art.-No.		C30A/89 S1	C30A/89 S2	C30A/2689 S1	C30A/2689 S2	
Technology	<a href="#">Page 7.1</a>	spiral flutes	spiral flutes	spiral flutes	spiral flutes	
Chamfer Length	<a href="#">Page 7.4</a>	C / 2-3 x P				
Surface	<a href="#">Page 7.5</a>			steam oxidized	steam oxidized	
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S1	S2	
Material Groups	<a href="#">Page 7.7</a>	universal use				
Ød <sub>1</sub>	P <sub>mm</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□	
M 2	0,4	40	9,5	3 2,5	1,6	
M 2,5	0,45	44	9,5	3 2,5	2,05	
M 3	0,5	46	9	4 3,2	2,5	●
M 4	0,7	52	11	5 4	3,3	●
M 5	0,8	60	13	5,5 4,5	4,2	●
M 6	1	62	15	6 4,5	5	●
M 8	1,25	70	22	6,2 5	6,80	
M 10	1,5	75	24	7 5,5	8,5	
M 12	1,75	82	29	8,5 6,5	10,2	

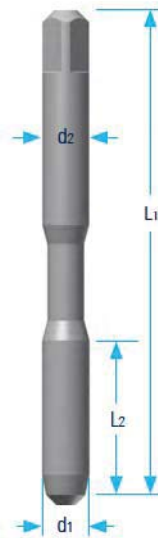
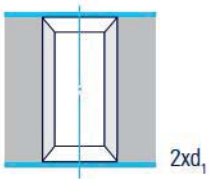
# M - Metric Coarse Thread



Under development  
Spiral Pointed Taps  
No Ring

JIS  
HSS-E/V3  
for universal use

Group C11A  
for through holes



Art.-No.		C11A/89 S1	C11A/89 S2	C11A/2689 S1	C11A/2689 S2
Technology	<a href="#">Page 7.1</a>	spiral point	spiral point	spiral point	spiral point
Chamfer Length	<a href="#">Page 7.4</a>	B / 3,5-5 x P			
Surface	<a href="#">Page 7.5</a>			steam oxidized	steam oxidized
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S1	S2
Material Groups	<a href="#">Page 7.7</a>	universal use			

Ød <sub>1</sub>	P <sub>mm</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□					
M 2	0,4	40	9,5	3	2,5	1,6				
M 2,5	0,45	44	9,5	3	2,5	2,05				
M 3	0,5	46	9	4	3,2	2,5		●		●
M 4	0,7	52	11	5	4	3,3		●		●
M 5	0,8	60	13	5,5	4,5	4,2		●		●
M 6	1	62	15	6	4,5	5		●		●
M 8	1,25	70	22	6,2	5	6,80				
M 10	1,5	75	24	7	5,5	8,5				
M 12	1,75	82	29	8,5	6,5	10,2				



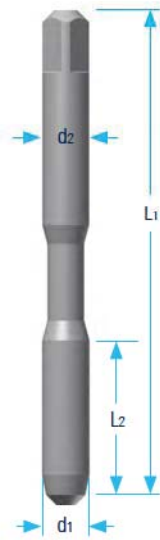
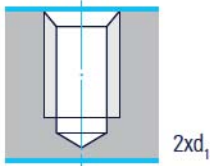
# M - Metric Coarse Thread



SL (previous symbol SP)  
Spiral Fluted Taps  
Black Ring

JIS  
HSS-E/V3  
RH spiral flutes 40°  
for universal use  
Recommended using  
CNC machine

Group C33A  
for blind holes



Art.-No.		C33A/89 S1	C33A/89 S2	C33A/89 S3	C33A/89 S4
Technology	<a href="#">Page 7.1</a>	Black Ring spiral flutes	Black Ring spiral flutes	Black Ring spiral flutes	Black Ring spiral flutes
Chamfer Length	<a href="#">Page 7.4</a>	C / 2-3 x P			
Surface	<a href="#">Page 7.5</a>				
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S3	S4
Material Groups	<a href="#">Page 7.7</a>	universal use			

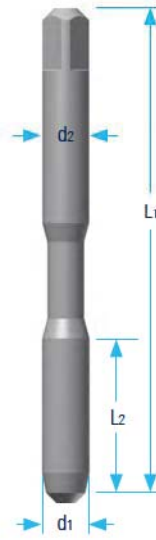
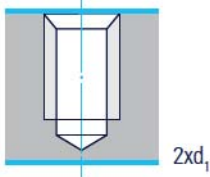
Ød <sub>1</sub>	P <sub>mm</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□	🌀				
M 1	0,25	30	7	3	2,5	0,75	●			
M 1,2	0,25	32	7	3	2,5	0,95	●			
M 1,4	0,3	34	9,5	3	2,5	1,1	●			
M 1,6	0,35	36	9,5	3	2,5	1,25	●			
M 1,7	0,35	36	9,5	3	2,5	1,35	●			
M 2	0,4	40	9,5	3	2,5	1,6	●	●	●	●
M 2,2	0,45	42	9,5	3	2,5	1,75				
M 2,3	0,4	42	9,5	3	2,5	1,9				
M 2,5	0,45	44	9,5	3	2,5	2,05	●	●	●	●
M 2,6	0,45	44	9,5	3	2,5	2,15	●	●		
M 3	0,5	46	9	4	3,2	2,5		●	●	●
M 3,5	0,6	48	13	4	3,2	2,9		●		
M 4	0,7	52	11	5	4	3,3		●	●	●
M 4,5	0,75	55	13	5	4	3,7				
M 5	0,8	60	13	5,5	4,5	4,2		●	●	●
M 6	1	62	15	6	4,5	5		●	●	●
M 7	1	65	19	6,2	5	6		●		
M 8	1,25	70	22	6,2	5	6,80		●		●
M 9	1,25	72	22	7	5,5	7,8				
M 10	1,5	75	24	7	5,5	8,5		●		●
M 11	1,5	80	25	8	6	9,5				
M 12	1,75	82	29	8,5	6,5	10,2		●		
M 14	2	88	30	10,5	8	12		●		

# M - Metric Coarse Thread

SL (previous symbol SP)  
Spiral Fluted Taps  
Black Ring

JIS  
HSS-E/V3  
RH spiral flutes 40°  
for universal use  
Recommended using  
CNC machine

Group C33A  
for blind holes



Art.-No.		C33A/89 S1	C33A/89 S2	C33A/89 S3	C33A/89 S4
Technology	Page 7.1	Black Ring spiral flutes	Black Ring spiral flutes	Black Ring spiral flutes	Black Ring spiral flutes
Chamfer Length	Page 7.4	C / 2-3 x P			
Surface	Page 7.5				
Tolerance	Page 7.6	S1	S2	S3	S4
Material Groups	Page 7.7	universal use			

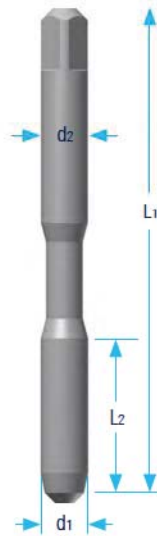
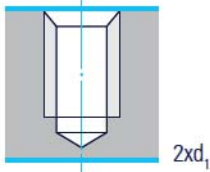
Ød <sub>1</sub>	P <sub>mm</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>		
M 16	2	95	32	12,5	10	14
M 18	2,5	100	37	14	11	15,5
M 20	2,5	105	37	15	12	17,5
M 22	2,5	115	38	17	13	19,5
M 24	3	120	45	19	15	21
M 27	3	130	45	20	15	24
M 30	3,5	135	48	23	17	26,5
M 33	3,5	145	51	25	19	29,5
M 36	4	155	57	28	21	32



## SL-OX (previous symbol SP-OX) Steam Oxide Spiral Fluted Taps Black Ring

JIS  
HSS-E/V3  
RH spiral flutes 40°  
for universal use  
Recommended using CNC machine  
Recommended using oily cutting fluid  
for steam oxide products

Group C33A  
for blind holes



Art.-No.		C33A/2689 S1	C33A/2689 S2	C33A/2689 S3	C33A/2689 S4
Technology	<a href="#">Page 7.1</a>	Black Ring spiral flutes	Black Ring spiral flutes	Black Ring spiral flutes	Black Ring spiral flutes
Chamfer Length	<a href="#">Page 7.4</a>	C / 2-3 x P			
Surface	<a href="#">Page 7.5</a>	steam oxidized	steam oxidized	steam oxidized	steam oxidized
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S3	S4
Material Groups	<a href="#">Page 7.7</a>	universal use			

Ød <sub>1</sub>	P <sub>mm</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□	🔩				
M 1	0,25	30	7	3	2,5	0,75				
M 1,2	0,25	32	7	3	2,5	0,95				
M 1,4	0,3	34	9,5	3	2,5	1,1				
M 1,6	0,35	36	9,5	3	2,5	1,25				
M 1,7	0,35	36	9,5	3	2,5	1,35				
M 2	0,4	40	9,5	3	2,5	1,6	●			
M 2,2	0,45	42	9,5	3	2,5	1,75				
M 2,3	0,4	42	9,5	3	2,5	1,9				
M 2,5	0,45	44	9,5	3	2,5	2,05	●			
M 2,6	0,45	44	9,5	3	2,5	2,15				
M 3	0,5	46	9	4	3,2	2,5		●		
M 3,5	0,6	48	13	4	3,2	2,9				
M 4	0,7	52	11	5	4	3,3		●		
M 4,5	0,75	55	13	5	4	3,7				
M 5	0,8	60	13	5,5	4,5	4,2		●	●	
M 6	1	62	15	6	4,5	5		●		
M 7	1	65	19	6,2	5	6		●		
M 8	1,25	70	22	6,2	5	6,8		●		
M 9	1,25	72	22	7	5,5	7,8				
M 10	1,5	75	24	7	5,5	8,5		●		
M 11	1,5	80	25	8	6	9,5				
M 12	1,75	82	29	8,5	6,5	10,2		●		
M 14	2	88	30	10,5	8	12		●		

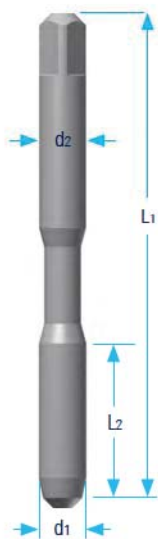
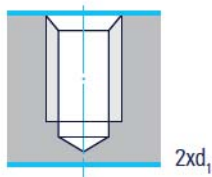


# M - Metric Coarse Thread

SL-OX (previous symbol SP-OX)  
Steam Oxide Spiral Fluted Taps  
Black Ring

JIS  
HSS-E/V3  
RH spiral flutes 40°  
for universal use  
Recommended using CNC machine  
Recommended using oily cutting fluid  
for steam oxide products

Group C33A  
for blind holes



Art-No.		C33A/2689 S1	C33A/2689 S2	C33A/2689 S3	C33A/2689 S4
Technology	<a href="#">Page 7.1</a>	Black Ring spiral flutes	Black Ring spiral flutes	Black Ring spiral flutes	Black Ring spiral flutes
Chamfer Length	<a href="#">Page 7.4</a>	C / 2-3 x P			
Surface	<a href="#">Page 7.5</a>	steam oxidized	steam oxidized	steam oxidized	steam oxidized
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S3	S4
Material Groups	<a href="#">Page 7.7</a>	universal use			

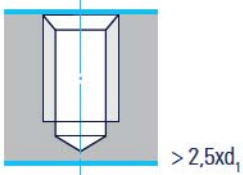
Ød <sub>1</sub>	P <sub>mm</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>		
M 16	2	95	32	12,5	10	14
M 18	2,5	100	37	14	11	15,5
M 20	2,5	105	37	15	12	17,5
M 22	2,5	115	38	17	13	19,5
M 24	3	120	45	19	15	21
M 27	3	130	45	20	15	24
M 30	3,5	135	48	23	17	26,5
M 33	3,5	145	51	25	19	29,5
M 36	4	155	57	28	21	32



SL2 / SL2-OX (previous symbol SP2 / SP2-OX)  
Spiral Fluted Taps (Short Thread Type)  
Black Ring

JIS  
HSS-E/V3  
RH spiral flutes 40°  
for universal use  
Recommended using CNC machine  
Recommended using oily cutting fluid  
for steam oxide products

Group C33A  
for deep blind holes



Art.-No.		C33A/3289 S1	C33A/3289 S2	C33A/263289 S1	C33A/263289 S2
Technology	<a href="#">Page 7.1</a>	Black Ring spiral flutes	Black Ring spiral flutes	Black Ring spiral flutes	Black Ring spiral flutes
Chamfer Length	<a href="#">Page 7.4</a>	C / 2-3 x P			
Surface	<a href="#">Page 7.5</a>			steam oxidized	steam oxidized
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S1	S2
Material Groups	<a href="#">Page 7.7</a>	universal use			

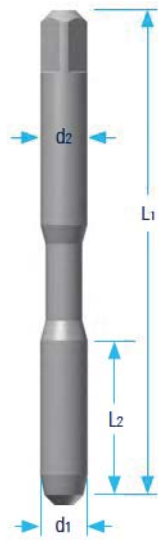
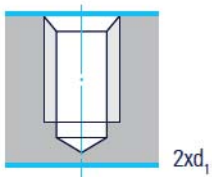
Ød <sub>1</sub>	P <sub>mm</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□	
M2	0,4	40	8	3	2,5	1,6
M2,5	0,45	44	9	3	2,5	2,05
M3	0,5	46	6	4	3,2	2,5
M4	0,7	52	7	5	4	3,3
M5	0,8	60	8	5,5	4,5	4,2
M6	1	62	10	6	4,5	5
M8	1,25	70	13	6,2	5	6,80
M10	1,5	75	15	7	5,5	8,5
M12	1,75	82	18	8,5	6,5	10,2



LS-SL (previous symbol LS-SP)  
Spiral Fluted Taps (Extended Shank)  
Black Ring

JIS  
HSS-E/V3  
RH spiral flutes 40°  
for universal use  
Recommended using CNC machine

Group C33A  
for blind holes



Art.-No.	C33A/4389 S1	C33A/4389 S2							
Technology	Black Ring spiral flutes	Black Ring spiral flutes							
Chamfer Length	C / 2-3 x P								
Surface									
Tolerance	S1	S2							
Material Groups	universal use								
Ød <sub>1</sub>	P <sub>mm</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□				
M 3	0,5	100	9	4	3,2	2,5			●
M 4	0,7	100	11	5	4	3,3			●
M 5	0,8	100	13	5,5	4,5	4,2			●
M 6	1	100	15	6	4,5	5			●
M 8	1,25	100	22	6,2	5	6,8			●
M 10	1,5	100	24	7	5,5	8,5			●
M 12	1,75	150	29	8,5	6,5	10,2			●

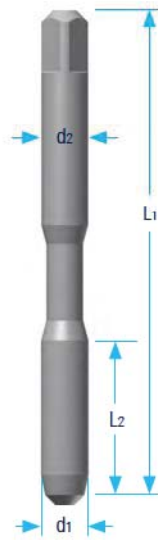
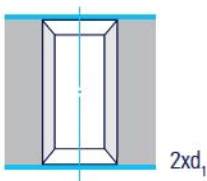
# M - Metric Coarse Thread



DL (previous symbol PO)  
Spiral Pointed Taps  
Black Ring

JIS  
HSS-E/V3  
for universal use  
Recommended using CNC machine

Group C19A  
for through holes



Art.-No.		C19A/89 S1	C19A/89 S2	C19A/89 S3	C19A/89 S4
Technology	<a href="#">Page 7.1</a>	Black Ring spiral point	Black Ring spiral point	Black Ring spiral point	Black Ring spiral point
Chamfer Length	<a href="#">Page 7.4</a>	B / 3,5-5 x P			
Surface	<a href="#">Page 7.5</a>				
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S3	S4
Material Groups	<a href="#">Page 7.7</a>	universal use			

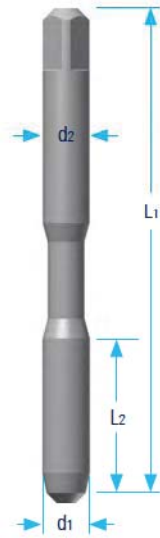
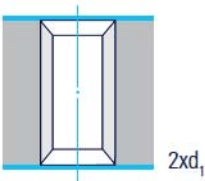
Ød <sub>1</sub>	P <sub>mm</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□	🔩				
M 1	0,25	30	7	3	2,5	0,75	●			
M 1,2	0,25	32	7	3	2,5	0,95	●			
M 1,4	0,3	34	9,5	3	2,5	1,1	●			
M 1,6	0,35	36	9,5	3	2,5	1,25	●			
M 1,7	0,35	36	9,5	3	2,5	1,35	●			
M 2	0,4	40	9,5	3	2,5	1,6		●		●
M 2,2	0,45	42	9,5	3	2,5	1,75				
M 2,3	0,4	42	9,5	3	2,5	1,9				
M 2,5	0,45	44	9,5	3	2,5	2,05		●		
M 2,6	0,45	44	9,5	3	2,5	2,15		●		
M 3	0,5	46	9	4	3,2	2,5		●		●
M 3,5	0,6	48	13	4	3,2	2,9		●		
M 4	0,7	52	11	5	4	3,3		●		●
M 4,5	0,75	55	13	5	4	3,7				
M 5	0,8	60	13	5,5	4,5	4,2		●		●
M 6	1	62	15	6	4,5	5		●	●	●
M 7	1	65	19	6,2	5	6				
M 8	1,25	70	22	6,2	5	6,8			●	
M 9	1,25	72	22	7	5,5	7,8				
M 10	1,5	75	24	7	5,5	8,5			●	
M 11	1,5	80	25	8	6	9,5				
M 12	1,75	82	29	8,5	6,5	10,2				●
M 14	2	88	30	10,5	8	12				●



DL (previous symbol PO)  
Spiral Pointed Taps  
Black Ring

JIS  
HSS-E/V3  
for universal use  
Recommended using CNC machine

Group C19A  
for through holes



Art.-No.		C19A/89 S1	C19A/89 S2	C19A/89 S3	C19A/89 S4
Technology	<a href="#">Page 7.1</a>	Black Ring spiral point	Black Ring spiral point	Black Ring spiral point	Black Ring spiral point
Chamfer Length	<a href="#">Page 7.4</a>	B / 3,5-5 x P			
Surface	<a href="#">Page 7.5</a>				
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S3	S4
Material Groups	<a href="#">Page 7.7</a>	universal use			

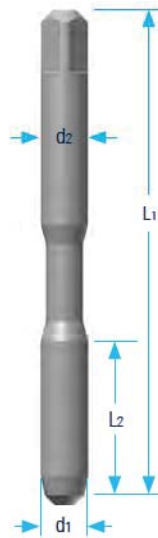
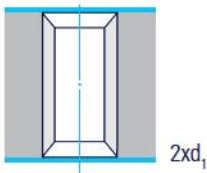
Ød <sub>1</sub>	P <sub>mm</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□	▯
M 16	2	95	32	12,5	10	14
M 18	2,5	100	37	14	11	15,5
M 20	2,5	105	37	15	12	17,5
M 22	2,5	115	38	17	13	19,5
M 24	3	120	45	19	15	21
M 27	3	130	45	20	15	24
M 30	3,5	135	48	23	17	26,5
M 33	3,5	145	51	25	19	29,5
M 36	4	155	57	28	21	32



DL-OX (previous symbol PO-OX)  
Steam Oxide Spiral Pointed Taps  
Black Ring

JIS  
HSS-E/V3  
for universal use  
Recommended using CNC machine  
Recommended using oily cutting fluid  
for steam oxide products

Group C19A  
for through holes



Art.-No.		C19A/2689 S1	C19A/2689 S2	C19A/2689 S3	C19A/2689 S4
Technology	<a href="#">Page 7.1</a>	Black Ring spiral point	Black Ring spiral point	Black Ring spiral point	Black Ring spiral point
Chamfer Length	<a href="#">Page 7.4</a>	B / 3,5-5 x P			
Surface	<a href="#">Page 7.5</a>	steam oxidized	steam oxidized	steam oxidized	steam oxidized
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S3	S4
Material Groups	<a href="#">Page 7.7</a>	universal use			

Ød <sub>1</sub>	P <sub>mm</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□	🌀				
M 1	0,25	30	7	3	2,5	0,75				
M 1,2	0,25	32	7	3	2,5	0,95				
M 1,4	0,3	34	9,5	3	2,5	1,1				
M 1,6	0,35	36	9,5	3	2,5	1,25				
M 1,7	0,35	36	9,5	3	2,5	1,35				
M 2	0,4	40	9,5	3	2,5	1,6	●			
M 2,2	0,45	42	9,5	3	2,5	1,75				
M 2,3	0,4	42	9,5	3	2,5	1,9				
M 2,5	0,45	44	9,5	3	2,5	2,05	●			
M 2,6	0,45	44	9,5	3	2,5	2,15				
M 3	0,5	46	9	4	3,2	2,5	●	●		●
M 3,5	0,6	48	13	4	3,2	2,9				
M 4	0,7	52	11	5	4	3,3	●			
M 4,5	0,75	55	13	5	4	3,7				
M 5	0,8	60	13	5,5	4,5	4,2	●			
M 6	1	62	15	6	4,5	5	●			
M 7	1	65	19	6,2	5	6				
M 8	1,25	70	22	6,2	5	6,8		●		
M 9	1,25	72	22	7	5,5	7,8				
M 10	1,5	75	24	7	5,5	8,5		●		
M 11	1,5	80	25	8	6	9,5				
M 12	1,75	82	29	8,5	6,5	10,2				●
M 14	2	88	30	10,5	8	12				●

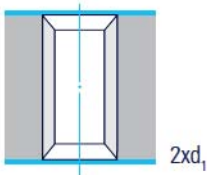
# M - Metric Coarse Thread



DL-OX (previous symbol PO-OX)  
Steam Oxide Spiral Pointed Taps  
Black Ring

JIS  
HSS-E/V3  
for universal use  
Recommended using CNC machine  
Recommended using oily cutting fluid  
for steam oxide products

Group C19A  
for through holes



Art.-No.		C19A/2689 S1	C19A/2689 S2	C19A/2689 S3	C19A/2689 S4
Technology	<a href="#">Page 7.1</a>	Black Ring spiral point	Black Ring spiral point	Black Ring spiral point	Black Ring spiral point
Chamfer Length	<a href="#">Page 7.4</a>	B / 3,5-5 x P			
Surface	<a href="#">Page 7.5</a>	steam oxidized	steam oxidized	steam oxidized	steam oxidized
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S3	S4
Material Groups	<a href="#">Page 7.7</a>	universal use			

Ød <sub>1</sub>	P <sub>mm</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□	🔩		
M 16	2	95	32	12,5	10	14		●
M 18	2,5	100	37	14	11	15,5		
M 20	2,5	105	37	15	12	17,5		●
M 22	2,5	115	38	17	13	19,5		
M 24	3	120	45	19	15	21		
M 27	3	130	45	20	15	24		
M 30	3,5	135	48	23	17	26,5		
M 33	3,5	145	51	25	19	29,5		
M 36	4	155	57	28	21	32		

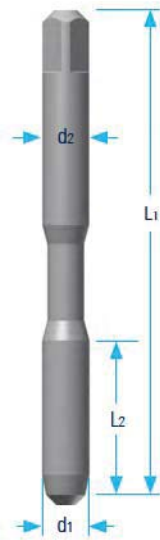
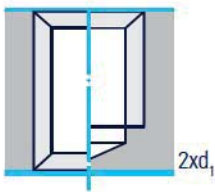
# M - Metric Coarse Thread



Under development  
Straight Flutes  
No Ring

JIS  
HSS-E/V3  
for universal use

Group C00A  
for blind and through holes



Art.-No.		C00A/89 S1	C00A/89 S2	C00A/89 S3	C00A/89 S4
Technology	<a href="#">Page 7.1</a>	straight flutes	straight flutes	straight flutes	straight flutes
Chamfer Length	<a href="#">Page 7.4</a>	C / 2-3 x P			
Surface	<a href="#">Page 7.5</a>				
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S3	S4
Material Groups	<a href="#">Page 7.7</a>	universal use			

Ød <sub>1</sub>	P <sub>mm</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□	🌀
M 1,2	0,25	32	5,5	3	2,5	0,95
M 1,4	0,3	34	7	3	2,5	1,1
M 1,6	0,35	36	8	3	2,5	1,25
M 1,7	0,35	36	8	3	2,5	1,35
M 2	0,4	40	8	3	2,5	1,6
M 2,5	0,45	44	9,5	3	2,5	2,05
M 2,6	0,45	44	9,5	3	2,5	2,15
M 3	0,5	46	9	4	3,2	2,5
M 3,5	0,6	48	13	4	3,2	2,9
M 4	0,7	52	11	5	4	3,3
M 5	0,8	60	13	5,5	4,5	4,2
M 6	1	62	15	6	4,5	5,0
M 8	1,25	70	22	6,2	5	6,8
M 10	1,5	75	24	7	5,5	8,5
M 12	1,75	82	29	8,5	6,5	10,2
M 14	2	88	30	10,5	8	12,0
M 16	2	95	32	12,5	10	14,0
M 20	2,5	105	37	15	12	17,5
M 24	3	120	45	19	15	21,0

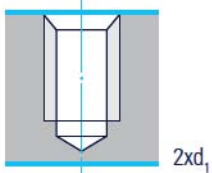


# M - Metric Coarse Thread

## VA-SL (previous symbol VA-SP) Spiral Fluted Taps Blue Ring

JIS  
HSS-E/V3  
RH spiral flutes 40°  
for stainless steel  
Recommended using CNC machine  
Recommended using oily cutting fluid  
for steam oxide products

Group C35A  
for blind holes



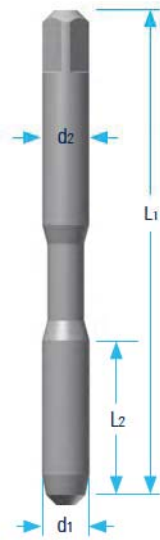
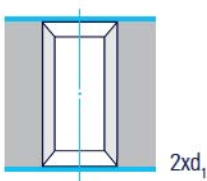
Art.-No.		C35A/2689 S1	C35A/2689 S2	C35A/2689 S3	C35A/2689 S4		
Technology	<a href="#">Page 7.1</a>	Blue Ring spiral flutes	Blue Ring spiral flutes	Blue Ring spiral flutes	Blue Ring spiral flutes		
Chamfer Length	<a href="#">Page 7.4</a>	C / 2-3 x P					
Surface	<a href="#">Page 7.5</a>	steam oxidized	steam oxidized	steam oxidized	steam oxidized		
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S3	S4		
Material Groups	<a href="#">Page 7.7</a>	stainless steel					
$\varnothing d_1$	P <sub>mm</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□		
M 2	0,4	40	9,5	3	2,5	1,6	●
M 2,5	0,45	44	9,5	3	2,5	2,05	●
M 2,6	0,45	44	9,5	3	2,5	2,15	
M 3	0,5	46	9	4	3,2	2,5	●
M 3,5	0,6	48	13	4	3,2	2,9	
M 4	0,7	52	11	5	4	3,3	●
M 5	0,8	60	13	5,5	4,5	4,2	●
M 6	1	62	15	6	4,5	5	●
M 8	1,25	70	22	6,2	5	6,8	●
M 10	1,5	75	24	7	5,5	8,5	●
M 12	1,75	82	29	8,5	6,5	10,2	●
M 14	2	88	30	10,5	8	12	
M 16	2	95	32	12,5	10	14	
M 18	2,5	100	37	14	11	15,5	
M 20	2,5	105	37	15	12	17,5	

# M - Metric Coarse Thread

**VA-DL (previous symbol VA-PO)**  
**Spiral Pointed Taps**  
**Blue Ring**

JIS  
HSS-E/V3  
for stainless steel  
Recommended using CNC machine  
Recommended using oily cutting fluid  
for steam oxide products

Group C12A  
for through holes



Art.-No.		C12A/2689 S1	C12A/2689 S2	C12A/2689 S3	C12A/2689 S4
Technology	<a href="#">Page 7.1</a>	Blue Ring spiral point	Blue Ring spiral point	Blue Ring spiral point	Blue Ring spiral point
Chamfer Length	<a href="#">Page 7.4</a>	B / 3,5-5 x P			
Surface	<a href="#">Page 7.5</a>	steam oxidized	steam oxidized	steam oxidized	steam oxidized
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S3	S4
Material Groups	<a href="#">Page 7.7</a>	stainless steel			

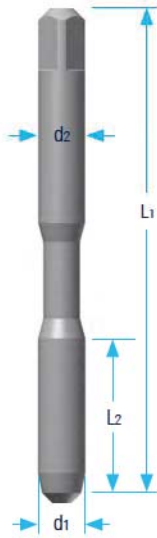
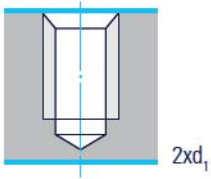
Ød <sub>1</sub>	P <sub>mm</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□	☞			
M 2	0,4	40	9,5	3	2,5	1,6			
M 2,5	0,45	44	9,5	3	2,5	2,05			
M 2,6	0,45	44	9,5	3	2,5	2,15			
M 3	0,5	46	9	4	3,2	2,5		●	
M 3,5	0,6	48	13	4	3,2	2,9			
M 4	0,7	52	11	5	4	3,3		●	
M 5	0,8	60	13	5,5	4,5	4,2		●	
M 6	1	62	15	6	4,5	5		●	
M 8	1,25	70	22	6,2	5	6,8			●
M 10	1,5	75	24	7	5,5	8,5			
M 12	1,75	82	29	8,5	6,5	10,2			
M 14	2	88	30	10,5	8	12			
M 16	2	95	32	12,5	10	14			
M 18	2,5	100	37	14	11	15,5			
M 20	2,5	105	37	15	12	17,5			



HD-SL (previous symbol HD-SP)  
Spiral Fluted Taps  
Red Ring

JIS  
HSS-E/V3  
RH spiral flutes 40°  
for HRC35 ~ 42 steel  
Recommended using CNC machine

Group C38A  
for blind holes



Art.-No.		C38A/89 S1	C38A/89 S2	C38A/89 S3	C38A/89 S4
Technology	<a href="#">Page 7.1</a>	Red Ring spiral flutes	Red Ring spiral flutes	Red Ring spiral flutes	Red Ring spiral flutes
Chamfer Length	<a href="#">Page 7.4</a>	C / 2-3 x P			
Surface	<a href="#">Page 7.5</a>				
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S3	S4
Material Groups	<a href="#">Page 7.7</a>	HRC35 ~ 42 steel			

Ød <sub>1</sub>	P <sub>mm</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□				
M 2	0,4	40	9,5	3	2,5	1,6			
M 2,5	0,45	44	9,5	3	2,5	2,05			
M 3	0,5	46	9	4	3,2	2,5			●
M 4	0,7	52	11	5	4	3,3			●
M 5	0,8	60	13	5,5	4,5	4,2			●
M 6	1	62	15	6	4,5	5			●
M 8	1,25	70	22	6,2	5	6,8			●
M 10	1,5	75	24	7	5,5	8,5			●
M 12	1,75	82	29	8,5	6,5	10,2			●

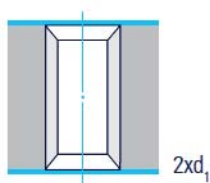
# M - Metric Coarse Thread



HD-DL (previous symbol HD-PO)  
Spiral Pointed Taps  
Red Ring

JIS  
HSS-E/V3  
for HRC35 ~ 42 steel  
Recommended using CNC machine

Group C17A  
for through holes



Art-No.		C17A/89 S1	C17A/89 S2	C17A/89 S3	C17A/89 S4
Technology	<a href="#">Page 7.1</a>	Red Ring spiral point	Red Ring spiral point	Red Ring spiral point	Red Ring spiral point
Chamfer Length	<a href="#">Page 7.4</a>	B / 3,5-5 x P			
Surface	<a href="#">Page 7.5</a>				
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S3	S4
Material Groups	<a href="#">Page 7.7</a>	HRC35 ~ 42 steel			

Ød <sub>1</sub>	P <sub>mm</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□	✎				
M 2	0,4	40	9,5	3	2,5	1,6				
M 2,5	0,45	44	9,5	3	2,5	2,05				
M 3	0,5	46	9	4	3,2	2,5			●	
M 4	0,7	52	11	5	4	3,3			●	
M 5	0,8	60	13	5,5	4,5	4,2			●	
M 6	1	62	15	6	4,5	5			●	
M 8	1,25	70	22	6,2	5	6,8				●
M 10	1,5	75	24	7	5,5	8,5				
M 12	1,75	82	29	8,5	6,5	10,2				



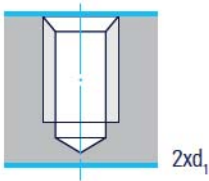
# M - Metric Coarse Thread



HD-SL-PM (Under development)  
Spiral Fluted Taps (High Performance)  
Red Ring - TYPHOON

JIS  
HSS-E/PM  
RH spiral flutes 45°  
for high strength steel  
Recommended using CNC machine

Group C34A  
for blind holes



Art.-No.		C34A/4889 S1	C34A/4889 S2	C34A/4889 S3	C34A/4889 S4
Technology	<a href="#">Page 7.1</a>	Red Ring spiral flutes	Red Ring spiral flutes	Red Ring spiral flutes	Red Ring spiral flutes
Chamfer Length	<a href="#">Page 7.4</a>	C / 2-3 x P			
Surface	<a href="#">Page 7.5</a>	TiCN	TiCN	TiCN	TiCN
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S3	S4
Material Groups	<a href="#">Page 7.7</a>	high strength steel / chemical resistant steel			

Ød <sub>1</sub>	P <sub>mm</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□				
M 2	0,4	40	9,5	3	2,5	1,6			
M 2,5	0,45	44	9,5	3	2,5	2,05			
M 3	0,5	46	9	4	3,2	2,5		●	
M 4	0,7	52	11	5	4	3,3		●	
M 5	0,8	60	13	5,5	4,5	4,2		●	
M 6	1	62	15	6	4,5	5		●	
M 8	1,25	70	22	6,2	5	6,8		●	
M 10	1,5	75	24	7	5,5	8,5			
M 12	1,75	82	29	8,5	6,5	10,2			

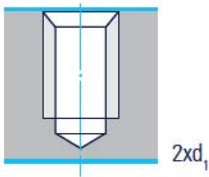




SL (previous symbol SP)  
Spiral Fluted Taps  
Black Ring

JIS  
HSS-E/V3  
RH spiral flutes 40°  
for universal use  
Recommended using CNC machine

Group C33A  
for blind holes



Art.-No.		C33A/89 S1	C33A/89 S2	C33A/89 S3	C33A/89 S4
Technology	<a href="#">Page 7.1</a>	Black Ring spiral flutes	Black Ring spiral flutes	Black Ring spiral flutes	Black Ring spiral flutes
Chamfer Length	<a href="#">Page 7.4</a>	C / 2-3 x P			
Surface	<a href="#">Page 7.5</a>				
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S3	S4
Material Groups	<a href="#">Page 7.7</a>	universal use			

Ød <sub>1</sub>	P <sub>mm</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□	🌀			
M 3	0,35	46	9	4	3,2	2,65			
M 3,5	0,35	48	13	4	3,2	3,15			
M 4	0,5	52	11	5	4	3,5			
M 4,5	0,5	55	13	5	4	4			
M 5	0,5	60	13	5,5	4,5	4,5	●		
M 6	0,5	62	15	6	4,5	5,5			
M 6	0,75	62	15	6	4,5	5,25	●		
M 7	0,75	65	19	6,2	5	6,25	●		
M 8	0,75	70	22	6,2	5	7,2	●		
M 8	1	70	22	6,2	5	7	●		
M 9	0,75	72	22	7	5,5	8,25			
M 9	1	72	22	7	5,5	8			
M 10	0,75	75	24	7	5,5	9,25			
M 10	1	75	24	7	5,5	9	●		
M 10	1,25	75	24	7	5,5	8,75	●		
M 11	0,75	80	25	8	6	10,25			
M 11	1	80	25	8	6	10			
M 12	1	82	29	8,5	6,5	11	●		
M 12	1,25	82	29	8,5	6,5	10,75	●		
M 12	1,5	82	29	8,5	6,5	10,5	●		
M 14	1	88	30	10,5	8	13			
M 14	1,25	88	30	10,5	8	12,75			
M 14	1,5	88	30	10,5	8	12,5	●		

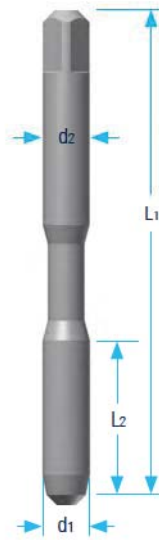
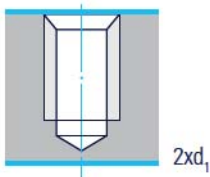




SL (previous symbol SP)  
Spiral Fluted Taps  
Black Ring

JIS  
HSS-E/V3  
RH spiral flutes 40°  
for universal use  
Recommended using CNC machine

Group C33A  
for blind holes



Art.-No.		C33A/89 S1	C33A/89 S2	C33A/89 S3	C33A/89 S4
Technology	<a href="#">Page 7.1</a>	Black Ring spiral flutes	Black Ring spiral flutes	Black Ring spiral flutes	Black Ring spiral flutes
Chamfer Length	<a href="#">Page 7.4</a>	C / 2-3 x P			
Surface	<a href="#">Page 7.5</a>				
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S3	S4
Material Groups	<a href="#">Page 7.7</a>	universal use			

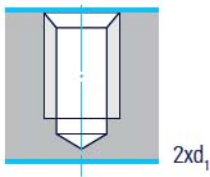
Ød <sub>1</sub>	P <sub>mm</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□	🌀				
M 15	1	90	30	10,5	8	14				
M 15	1,5	90	30	10,5	8	13,5				
M 16	1	95	32	12,5	10	15				
M 16	1,5	95	32	12,5	10	14,5			●	
M 18	1	100	37	14	11	17				
M 18	1,5	100	37	14	11	16,5				
M 18	2	100	37	14	11	16				
M 20	1	105	37	15	12	19				
M 20	1,5	105	37	15	12	18,5				
M 20	2	105	37	15	12	18				
M 22	1	115	38	17	13	21,0				
M 22	1,5	115	38	17	13	20,5				
M 22	2	115	38	17	13	20				
M 24	1	120	45	19	15	23				
M 24	1,5	120	45	19	15	22,5				
M 24	2	120	45	19	15	22				
M 25	1,5	125	45	19	15	23,5				
M 25	2	125	45	19	15	23				
M 26	1	125	45	20	15	25				
M 26	1,5	125	45	20	15	24,5				
M 26	2	125	45	20	15	24				
M 27	1,5	130	45	20	15	25,5				
M 27	2	130	45	20	15	25				



SL (previous symbol SP)  
Spiral Fluted Taps  
Black Ring

JIS  
HSS-E/V3  
RH spiral flutes 40°  
for universal use  
Recommended using CNC machine

Group C33A  
for blind holes



Art.-No.	C33A/89 S1	C33A/89 S2	C33A/89 S3	C33A/89 S4
Technology <a href="#">Page 7.1</a>	Black Ring spiral flutes	Black Ring spiral flutes	Black Ring spiral flutes	Black Ring spiral flutes
Chamfer Length <a href="#">Page 7.4</a>	C / 2-3 x P			
Surface <a href="#">Page 7.5</a>				
Tolerance <a href="#">Page 7.6</a>	S1	S2	S3	S4
Material Groups <a href="#">Page 7.7</a>	universal use			

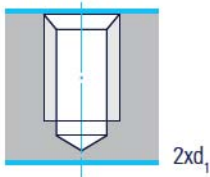
Ød <sub>1</sub>	P <sub>mm</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□				
M 28	1,5	130	45	21	17	26,5			
M 28	2	130	45	21	17	26			
M 30	1	135	48	23	17	29			
M 30	1,5	135	48	23	17	28,5			
M 30	2	135	48	23	17	28			
M 30	3	135	48	23	17	27			
M 33	1,5	145	45	25	19	31,5			
M 33	2	145	45	25	19	31			
M 33	3	145	51	25	19	30			
M 36	1,5	155	45	28	21	34,5			
M 36	2	155	45	28	21	34			
M 36	3	155	57	28	21	33			



## SL-OX (previous symbol SP-OX) Steam Oxide Spiral Fluted Taps Black Ring

JIS  
HSS-E/V3  
RH spiral flutes 40°  
for universal use  
Recommended using CNC machine  
Recommended using oily cutting fluid  
for steam oxide products

Group C33A  
for blind holes



Art.-No.		C33A/2689 S1	C33A/2689 S2	C33A/2689 S3	C33A/2689 S4
Technology	<a href="#">Page 7.1</a>	Black Ring spiral flutes	Black Ring spiral flutes	Black Ring spiral flutes	Black Ring spiral flutes
Chamfer Length	<a href="#">Page 7.4</a>	C / 2-3 x P			
Surface	<a href="#">Page 7.5</a>	steam oxidized	steam oxidized	steam oxidized	steam oxidized
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S3	S4
Material Groups	<a href="#">Page 7.7</a>	universal use			

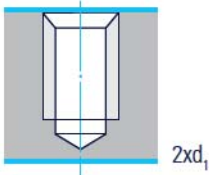
Ød <sub>1</sub>	P <sub>mm</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□	🔩
M 3	0,35	46	9	4	3,2	2,65
M 3,5	0,35	48	13	4	3,2	3,15
M 4	0,5	52	11	5	4	3,5
M 4,5	0,5	55	13	5	4	4
M 5	0,5	60	13	5,5	4,5	4,5
M 6	0,5	62	15	6	4,5	5,5
M 6	0,75	62	15	6	4,5	5,25
M 7	0,75	65	19	6,2	5	6,25
M 8	0,75	70	22	6,2	5	7,2
M 8	1	70	22	6,2	5	7
M 9	0,75	72	22	7	5,5	8,25
M 9	1	72	22	7	5,5	8
M 10	0,75	75	24	7	5,5	9,25
M 10	1	75	24	7	5,5	9
M 10	1,25	75	24	7	5,5	8,75
M 11	0,75	80	25	8	6	10,25
M 11	1	80	25	8	6	10
M 12	1	82	29	8,5	6,5	11
M 12	1,25	82	29	8,5	6,5	10,75
M 12	1,5	82	29	8,5	6,5	10,5
M 14	1	88	30	10,5	8	13
M 14	1,25	88	30	10,5	8	12,75
M 14	1,5	88	30	10,5	8	12,5



## SL-OX (previous symbol SP-OX) Steam Oxide Spiral Fluted Taps Black Ring

JIS  
HSS-E/V3  
RH spiral flutes 40°  
for universal use  
Recommended using CNC machine  
Recommended using oily cutting fluid  
for steam oxide products

Group C33A  
for blind holes



Art.-No.		C33A/2689 S1	C33A/2689 S2	C33A/2689 S3	C33A/2689 S4
Technology	<a href="#">Page 7.1</a>	Black Ring spiral flutes	Black Ring spiral flutes	Black Ring spiral flutes	Black Ring spiral flutes
Chamfer Length	<a href="#">Page 7.4</a>	C / 2-3 x P			
Surface	<a href="#">Page 7.5</a>	steam oxidized	steam oxidized	steam oxidized	steam oxidized
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S3	S4
Material Groups	<a href="#">Page 7.7</a>	universal use			

Ød <sub>1</sub>	P <sub>mm</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□	mm
M 15	1	90	30	10,5	8	14
M 15	1,5	90	30	10,5	8	13,5
M 16	1	95	32	12,5	10	15
M 16	1,5	95	32	12,5	10	14,5
M 18	1	100	37	14	11	17
M 18	1,5	100	37	14	11	16,5
M 18	2	100	37	14	11	16
M 20	1	105	37	15	12	19
M 20	1,5	105	37	15	12	18,5
M 20	2	105	37	15	12	18
M 22	1	115	38	17	13	21,0
M 22	1,5	115	38	17	13	20,5
M 22	2	115	38	17	13	20
M 24	1	120	45	19	15	23
M 24	1,5	120	45	19	15	22,5
M 24	2	120	45	19	15	22
M 25	1,5	125	45	19	15	23,5
M 25	2	125	45	19	15	23
M 26	1	125	45	20	15	25
M 26	1,5	125	45	20	15	24,5
M 26	2	125	45	20	15	24
M 27	1,5	130	45	20	15	25,5
M 27	2	130	45	20	15	25

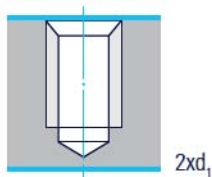




SL-OX (previous symbol SP-OX)  
Steam Oxide Spiral Fluted Taps  
Black Ring

JIS  
HSS-E/V3  
RH spiral flutes 40°  
for universal use  
Recommended using CNC machine  
Recommended using oily cutting fluid  
for steam oxide products

Group C33A  
for blind holes



Art.-No.		C33A/2689 S1	C33A/2689 S2	C33A/2689 S3	C33A/2689 S4
Technology	<a href="#">Page 7.1</a>	Black Ring spiral flutes	Black Ring spiral flutes	Black Ring spiral flutes	Black Ring spiral flutes
Chamfer Length	<a href="#">Page 7.4</a>	C / 2-3 x P			
Surface	<a href="#">Page 7.5</a>	steam oxidized	steam oxidized	steam oxidized	steam oxidized
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S3	S4
Material Groups	<a href="#">Page 7.7</a>	universal use			

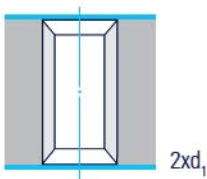
$\varnothing d_1$	$P_{mm}$	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□	
M 28	1,5	130	45	21	17	26,5
M 28	2	130	45	21	17	26
M 30	1	135	48	23	17	29
M 30	1,5	135	48	23	17	28,5
M 30	2	135	48	23	17	28
M 30	3	135	48	23	17	27
M 33	1,5	145	45	25	19	31,5
M 33	2	145	45	25	19	31
M 33	3	145	51	25	19	30
M 36	1,5	155	45	28	21	34,5
M 36	2	155	45	28	21	34
M 36	3	155	57	28	21	33



DL (previous symbol PO)  
Spiral Pointed Taps  
Black Ring

JIS  
HSS-E/V3  
for universal use  
Recommended using CNC machine

Group C19A  
for through holes



Art.-No.		C19A/89 S1	C19A/89 S2	C19A/89 S3	C19A/89 S4
Technology	<a href="#">Page 7.1</a>	Black Ring spiral point	Black Ring spiral point	Black Ring spiral point	Black Ring spiral point
Chamfer Length	<a href="#">Page 7.4</a>	B / 3,5-5 x P			
Surface	<a href="#">Page 7.5</a>				
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S3	S4
Material Groups	<a href="#">Page 7.7</a>	universal use			

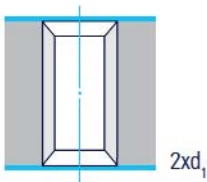
Ød <sub>1</sub>	P <sub>mm</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□	
M 3	0,35	46	9	4	3,2	2,65
M 3,5	0,35	48	13	4	3,2	3,15
M 4	0,5	52	11	5	4	3,5
M 4,5	0,5	55	13	5	4	4
M 5	0,5	60	13	5,5	4,5	4,5
M 6	0,5	62	15	6	4,5	5,5
M 6	0,75	62	15	6	4,5	5,25
M 7	0,75	65	19	6,2	5	6,25
M 8	0,75	70	22	6,2	5	7,2
M 8	1	70	22	6,2	5	7
M 9	0,75	72	22	7	5,5	8,25
M 9	1	72	22	7	5,5	8
M 10	0,75	75	24	7	5,5	9,25
M 10	1	75	24	7	5,5	9
M 10	1,25	75	24	7	5,5	8,75
M 11	0,75	80	25	8	6	10,25
M 11	1	80	25	8	6	10
M 12	1	82	29	8,5	6,5	11
M 12	1,25	82	29	8,5	6,5	10,75
M 12	1,5	82	29	8,5	6,5	10,5
M 14	1	88	30	10,5	8	13
M 14	1,25	88	30	10,5	8	12,75
M 14	1,5	88	30	10,5	8	12,5



DL (previous symbol PO)  
Spiral Pointed Taps  
Black Ring

JIS  
HSS-E/V3  
for universal use  
Recommended using CNC machine

Group C19A  
for through holes



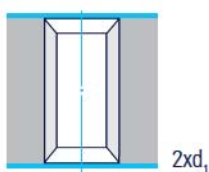
Art.-No.		C19A/89 S1	C19A/89 S2	C19A/89 S3	C19A/89 S4
Technology	<a href="#">Page 7.1</a>	Black Ring spiral point	Black Ring spiral point	Black Ring spiral point	Black Ring spiral point
Chamfer Length	<a href="#">Page 7.4</a>	B / 3,5-5 x P			
Surface	<a href="#">Page 7.5</a>				
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S3	S4
Material Groups	<a href="#">Page 7.7</a>	universal use			

Ød <sub>1</sub>	P <sub>mm</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□	🌀				
M 15	1	90	30	10,5	8	14				
M 15	1,5	90	30	10,5	8	13,5				
M 16	1	95	32	12,5	10	15				
M 16	1,5	95	32	12,5	10	14,5				
M 18	1	100	37	14	11	17				
M 18	1,5	100	37	14	11	16,5				
M 18	2	100	37	14	11	16				
M 20	1	105	37	15	12	19				
M 20	1,5	105	37	15	12	18,5				
M 20	2	105	37	15	12	18				
M 22	1	115	38	17	13	21,0				
M 22	1,5	115	38	17	13	20,5				
M 22	2	115	38	17	13	20				
M 24	1	120	45	19	15	23				
M 24	1,5	120	45	19	15	22,5				
M 24	2	120	45	19	15	22				
M 25	1,5	125	45	19	15	23,5				
M 25	2	125	45	19	15	23				
M 26	1	125	45	20	15	25				
M 26	1,5	125	45	20	15	24,5				
M 26	2	125	45	20	15	24				
M 27	1,5	130	45	20	15	25,5				
M 27	2	130	45	20	15	25				


DL (previous symbol PO)  
Spiral Pointed Taps  
Black Ring

JIS  
HSS-E/V3  
for universal use  
Recommended using CNC machine

Group C19A  
for through holes



Art.-No.		C19A/89 S1	C19A/89 S2	C19A/89 S3	C19A/89 S4
Technology	<a href="#">Page 7.1</a>	Black Ring spiral point	Black Ring spiral point	Black Ring spiral point	Black Ring spiral point
Chamfer Length	<a href="#">Page 7.4</a>	B / 3,5-5 x P			
Surface	<a href="#">Page 7.5</a>				
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S3	S4
Material Groups	<a href="#">Page 7.7</a>	universal use			

$\varnothing d_1$	P <sub>mm</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□	
M 28	1,5	130	45	21	17	26,5
M 28	2	130	45	21	17	26
M 30	1	135	48	23	17	29
M 30	1,5	135	48	23	17	28,5
M 30	2	135	48	23	17	28
M 30	3	135	48	23	17	27
M 33	1,5	145	45	25	19	31,5
M 33	2	145	45	25	19	31
M 33	3	145	51	25	19	30
M 36	1,5	155	45	28	21	34,5
M 36	2	155	45	28	21	34
M 36	3	155	57	28	21	33

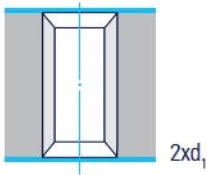




DL-OX (previous symbol PO-OX)  
Steam Oxide Spiral Pointed Taps  
Black Ring

JIS  
HSS-E/V3  
for universal use  
Recommended using CNC machine  
Recommended using oily cutting fluid  
for steam oxide products

Group C19A  
for through holes



Art.-No.		C19A/2689 S1	C19A/2689 S2	C19A/2689 S3	C19A/2689 S4
Technology	<a href="#">Page 7.1</a>	Black Ring spiral point	Black Ring spiral point	Black Ring spiral point	Black Ring spiral point
Chamfer Length	<a href="#">Page 7.4</a>	B / 3,5-5 x P			
Surface	<a href="#">Page 7.5</a>	steam oxidized	steam oxidized	steam oxidized	steam oxidized
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S3	S4
Material Groups	<a href="#">Page 7.7</a>	universal use			

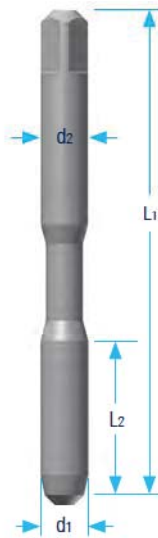
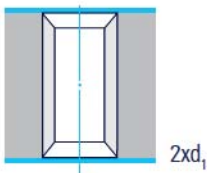
Ød <sub>1</sub>	P <sub>mm</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□	🌀
M 3	0,35	46	9	4	3,2	2,65
M 3,5	0,35	48	13	4	3,2	3,15
M 4	0,5	52	11	5	4	3,5
M 4,5	0,5	55	13	5	4	4
M 5	0,5	60	13	5,5	4,5	4,5
M 6	0,5	62	15	6	4,5	5,5
M 6	0,75	62	15	6	4,5	5,25
M 7	0,75	65	19	6,2	5	6,25
M 8	0,75	70	22	6,2	5	7,2
M 8	1	70	22	6,2	5	7
M 9	0,75	72	22	7	5,5	8,25
M 9	1	72	22	7	5,5	8
M 10	0,75	75	24	7	5,5	9,25
M 10	1	75	24	7	5,5	9
M 10	1,25	75	24	7	5,5	8,75
M 11	0,75	80	25	8	6	10,25
M 11	1	80	25	8	6	10
M 12	1	82	29	8,5	6,5	11
M 12	1,25	82	29	8,5	6,5	10,75
M 12	1,5	82	29	8,5	6,5	10,5
M 14	1	88	30	10,5	8	13
M 14	1,25	88	30	10,5	8	12,75
M 14	1,5	88	30	10,5	8	12,5



DL-OX (previous symbol PO-OX)  
Steam Oxide Spiral Pointed Taps  
Black Ring

JIS  
HSS-E/V3  
for universal use  
Recommended using CNC machine  
Recommended using oily cutting fluid  
for steam oxide products

Group C19A  
for through holes



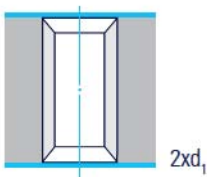
Art.-No.		C19A/2689 S1	C19A/2689 S2	C19A/2689 S3	C19A/2689 S4
Technology	<a href="#">Page 7.1</a>	Black Ring spiral point	Black Ring spiral point	Black Ring spiral point	Black Ring spiral point
Chamfer Length	<a href="#">Page 7.4</a>	B / 3,5-5 x P			
Surface	<a href="#">Page 7.5</a>	steam oxidized	steam oxidized	steam oxidized	steam oxidized
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S3	S4
Material Groups	<a href="#">Page 7.7</a>	universal use			

Ød <sub>1</sub>	P <sub>mm</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□	mm				
M 15	1	90	30	10,5	8	14				
M 15	1,5	90	30	10,5	8	13,5				
M 16	1	95	32	12,5	10	15				
M 16	1,5	95	32	12,5	10	14,5				
M 18	1	100	37	14	11	17				
M 18	1,5	100	37	14	11	16,5				
M 18	2	100	37	14	11	16				
M 20	1	105	37	15	12	19				
M 20	1,5	105	37	15	12	18,5				
M 20	2	105	37	15	12	18				
M 22	1	115	38	17	13	21,0				
M 22	1,5	115	38	17	13	20,5				
M 22	2	115	38	17	13	20				
M 24	1	120	45	19	15	23				
M 24	1,5	120	45	19	15	22,5				
M 24	2	120	45	19	15	22				
M 25	1,5	125	45	19	15	23,5				
M 25	2	125	45	19	15	23				
M 26	1	125	45	20	15	25				
M 26	1,5	125	45	20	15	24,5				
M 26	2	125	45	20	15	24				
M 27	1,5	130	45	20	15	25,5				
M 27	2	130	45	20	15	25				


DL-OX (previous symbol PO-OX)  
Steam Oxide Spiral Pointed Taps  
Black Ring

JIS  
HSS-E/V3  
for universal use  
Recommended using CNC machine  
Recommended using oily cutting fluid  
for steam oxide products

Group C19A  
for through holes



Art.-No.		C19A/2689 S1	C19A/2689 S2	C19A/2689 S3	C19A/2689 S4
Technology	<a href="#">Page 7.1</a>	Black Ring spiral point	Black Ring spiral point	Black Ring spiral point	Black Ring spiral point
Chamfer Length	<a href="#">Page 7.4</a>	B / 3,5-5 x P			
Surface	<a href="#">Page 7.5</a>	steam oxidized	steam oxidized	steam oxidized	steam oxidized
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S3	S4
Material Groups	<a href="#">Page 7.7</a>	universal use			

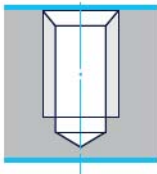
Ød <sub>1</sub>	P <sub>mm</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□	
M 28	1,5	130	45	21	17	26,5
M 28	2	130	45	21	17	26
M 30	1	135	48	23	17	29
M 30	1,5	135	48	23	17	28,5
M 30	2	135	48	23	17	28
M 30	3	135	48	23	17	27
M 33	1,5	145	45	25	19	31,5
M 33	2	145	45	25	19	31
M 33	3	145	51	25	19	30
M 36	1,5	155	45	28	21	34,5
M 36	2	155	45	28	21	34
M 36	3	155	57	28	21	33



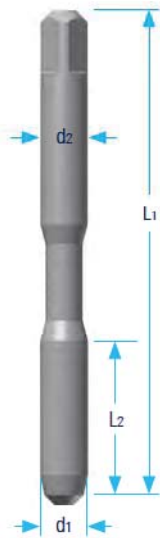
SL (previous symbol SP)  
Spiral Fluted Taps  
Black Ring

JIS  
HSS-E/V3  
RH spiral flutes 40°  
for universal use  
Recommended using CNC machine

Group C33A  
for blind holes



2xd<sub>1</sub>



Art.-No.		C33A/89 S1	C33A/89 S2	C33A/89 S3	C33A/89 S4
Technology	<a href="#">Page 7.1</a>	Black Ring spiral flutes	Black Ring spiral flutes	Black Ring spiral flutes	Black Ring spiral flutes
Chamfer Length	<a href="#">Page 7.4</a>	C / 2-3 x P			
Surface	<a href="#">Page 7.5</a>				
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S3	S4
Material Groups	<a href="#">Page 7.7</a>	universal use			

Ød <sub>1</sub>	P <sub>tpi</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□	🌀				
No. 1	64	36	9,5	3	2,5	1,5				
No. 2	56	42	9,5	3	2,5	1,8	●			
No. 3	48	44	9,5	3	2,5	2,1				
No. 4	40	44	9,5	3	2,5	2,3	●			
No. 5	40	46	9	4	3,2	2,5	●			
No. 6	32	52	11	5	4	3,3		●		●
No. 8	32	52	11	5	4	3,3		●		●
No. 10	24	60	13	5,5	4,5	4,2		●		
No. 12	24	60	13	5,5	4,5	4,2		●		
1/4"	20	62	15	6	4,5	5		●		
5/16"	18	70	22	6,1	5	6,6		●		
3/8"	16	75	24	7	5,5	8,0		●		
7/16"	14	80	25	8	6	9,4		●		
1/2"	13	85	29	9	7	10,8		●		
9/16"	12	90	30	10,5	8	12,2		●		
5/8"	11	95	32	12	9	13,6			●	
3/4"	10	105	37	14	11	16,5			●	
7/8"	9	115	38	17	13	19,5			●	
1"	8	125	45	20	15	22,25			●	
1 1/4"	7									
1 1/2"	6									

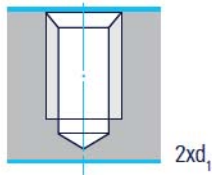




## SL-OX (previous symbol SP-OX) Steam Oxide Spiral Fluted Taps Black Ring

JIS  
HSS-E/V3  
RH spiral flutes 40°  
for universal use  
Recommended using CNC machine  
Recommended using oily cutting fluid  
for steam oxide products

Group C33A  
for blind holes



Art.-No.		C33A/2689 S1	C33A/2689 S2	C33A/2689 S3	C33A/2689 S4
Technology	<a href="#">Page 7.1</a>	Black Ring spiral flutes	Black Ring spiral flutes	Black Ring spiral flutes	Black Ring spiral flutes
Chamfer Length	<a href="#">Page 7.4</a>	C / 2-3 x P			
Surface	<a href="#">Page 7.5</a>	steam oxidized	steam oxidized	steam oxidized	steam oxidized
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S3	S4
Material Groups	<a href="#">Page 7.7</a>	universal use			

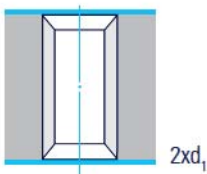
Ød <sub>1</sub>	P <sub>tpi</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□	🌀			
No. 1	64	36	9,5	3	2,5	1,5			
No. 2	56	42	9,5	3	2,5	1,8			
No. 3	48	44	9,5	3	2,5	2,1			
No. 4	40	44	9,5	3	2,5	2,3	●		
No. 5	40	46	9	4	3,2	2,5			
No. 6	32	52	11	5	4	3,3	●		
No. 8	32	52	11	5	4	3,3	●		
No. 10	24	60	13	5,5	4,5	4,2			
No. 12	24	60	13	5,5	4,5	4,2			
1/4"	20	62	15	6	4,5	5	●		
5/16"	18	70	22	6,1	5	6,6	●		
3/8"	16	75	24	7	5,5	8,0	●		
7/16"	14	80	25	8	6	9,4			
1/2"	13	85	29	9	7	10,8	●		
9/16"	12	90	30	10,5	8	12,2			
5/8"	11	95	32	12	9	13,6			
3/4"	10	105	37	14	11	16,5			
7/8"	9	115	38	17	13	19,5			
1"	8	125	45	20	15	22,25			



DL (previous symbol PO)  
Spiral Pointed Taps  
Black Ring

JIS  
HSS-E/V3  
for universal use  
Recommended using CNC machine

Group C19A  
for through holes



Art.-No.		C19A/89 S1	C19A/89 S2	C19A/89 S3	C19A/89 S4
Technology	<a href="#">Page 7.1</a>	Black Ring spiral point	Black Ring spiral point	Black Ring spiral point	Black Ring spiral point
Chamfer Length	<a href="#">Page 7.4</a>	B / 3,5-5 x P			
Surface	<a href="#">Page 7.5</a>				
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S3	S4
Material Groups	<a href="#">Page 7.7</a>	universal use			

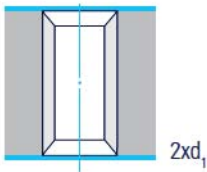
Ød <sub>1</sub>	P <sub>tpi</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□					
No. 1	64	36	9,5	3	2,5	1,5	●			
No. 2	56	42	9,5	3	2,5	1,8	●			
No. 3	48	44	9,5	3	2,5	2,1	●			
No. 4	40	44	9,5	3	2,5	2,3		●		
No. 5	40	46	9	4	3,2	2,5			●	
No. 6	32	52	11	5	4	3,3		●		
No. 8	32	52	11	5	4	3,3		●		
No. 10	24	60	13	5,5	4,5	4,2		●		
No. 12	24	60	13	5,5	4,5	4,2				
1/4"	20	62	15	6	4,5	5			●	
5/16"	18	70	22	6,1	5	6,6			●	
3/8"	16	75	24	7	5,5	8,0			●	
7/16"	14	80	25	8	6	9,4				
1/2"	13	85	29	9	7	10,8			●	
9/16"	12	90	30	10,5	8	12,2				
5/8"	11	95	32	12	9	13,6			●	
3/4"	10	105	37	14	11	16,5				
7/8"	9	115	38	17	13	19,5				
1"	8	125	45	20	15	22,25				



## DL-OX (previous symbol PO-OX) Steam Oxide Spiral Pointed Taps Black Ring

JIS  
HSS-E/V3  
for universal use  
Recommended using CNC machine  
Recommended using oily cutting fluid  
for steam oxide products

Group C19A  
for through holes



Art.-No.		C19A/2689 S1	C19A/2689 S2	C19A/2689 S3	C19A/2689 S4
Technology	<a href="#">Page 7.1</a>	Black Ring spiral point	Black Ring spiral point	Black Ring spiral point	Black Ring spiral point
Chamfer Length	<a href="#">Page 7.4</a>	B / 3,5-5 x P			
Surface	<a href="#">Page 7.5</a>	steam oxidized	steam oxidized	steam oxidized	steam oxidized
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S3	S4
Material Groups	<a href="#">Page 7.7</a>	universal use			

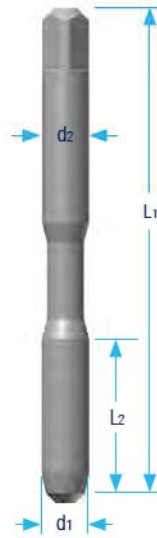
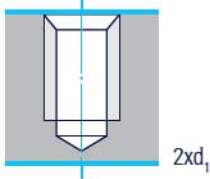
$\varnothing d_1$	P <sub>tpi</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	$\square$	
No. 1	64	36	9,5	3	2,5	1,5
No. 2	56	42	9,5	3	2,5	1,8
No. 3	48	44	9,5	3	2,5	2,1
No. 4	40	44	9,5	3	2,5	2,3
No. 5	40	46	9	4	3,2	2,5
No. 6	32	52	11	5	4	3,3
No. 8	32	52	11	5	4	3,3
No. 10	24	60	13	5,5	4,5	4,2
No. 12	24	60	13	5,5	4,5	4,2
1/4"	20	62	15	6	4,5	5
5/16"	18	70	22	6,1	5	6,6
3/8"	16	75	24	7	5,5	8,0
7/16"	14	80	25	8	6	9,4
1/2"	13	85	29	9	7	10,8
9/16"	12	90	30	10,5	8	12,2
5/8"	11	95	32	12	9	13,6
3/4"	10	105	37	14	11	16,5
7/8"	9	115	38	17	13	19,5
1"	8	125	45	20	15	22,25



SL (previous symbol SP)  
Spiral Fluted Taps  
Black Ring

JIS  
HSS-E/V3  
RH spiral flutes 40°  
for universal use  
Recommended using CNC machine

Group C33A  
for blind holes



Art.-No.		C33A/89 S1	C33A/89 S2	C33A/89 S3	C33A/89 S4					
Technology	<a href="#">Page 7.1</a>	Black Ring spiral flutes	Black Ring spiral flutes	Black Ring spiral flutes	Black Ring spiral flutes					
Chamfer Length	<a href="#">Page 7.4</a>	C / 2-3 x P								
Surface	<a href="#">Page 7.5</a>									
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S3	S4					
Material Groups	<a href="#">Page 7.7</a>	universal use								
Ød <sub>1</sub>	P <sub>tpi</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□					
No. 0	80	36	9,5	3	2,5	1,25	●			
No. 1	72	36	9,5	3	2,5	1,55				
No. 2	64	42	9,5	3	2,5	1,9				
No. 3	56	44	9,5	3	2,5	2,1				
No. 4	48	44	9,5	3	2,5	2,4				
No. 5	44	46	9	4	3,2	2,5				
No. 6	40	52	11	5	4	3,3				
No. 8	36	52	11	5	4	3,3				
No. 10	32	60	13	5,5	4,5	4,2		●		
No. 12	28	60	13	5,5	4,5	4,2				
1/4"	28	62	15	6	4,5	5		●		
5/16"	24	70	22	6,1	5	6,9		●		
3/8"	24	75	24	7	5,5	8,5		●		
7/16"	20	80	25	8	6	9,9		●		
1/2"	20	85	29	9	7	11,5		●		
9/16"	18	90	30	10,5	8	12,9		●		
5/8"	18	95	32	12	9	14,5		●		
3/4"	16	105	37	14	11	17,5		●		
7/8"	14	115	38	17	13	20,4				
1"	12	125	45	20	15	23,25				

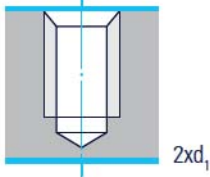




## SL-OX (previous symbol SP-OX) Steam Oxide Spiral Fluted Taps Black Ring

JIS  
HSS-E/V3  
RH spiral flutes 40°  
for universal use  
Recommended using CNC machine  
Recommended using oily cutting fluid  
for steam oxide products

Group C33A  
for blind holes



Art.-No.		C33A/2689 S1	C33A/2689 S2	C33A/2689 S3	C33A/2689 S4
Technology	<a href="#">Page 7.1</a>	Black Ring spiral flutes	Black Ring spiral flutes	Black Ring spiral flutes	Black Ring spiral flutes
Chamfer Length	<a href="#">Page 7.4</a>	C / 2-3 x P			
Surface	<a href="#">Page 7.5</a>	steam oxidized	steam oxidized	steam oxidized	steam oxidized
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S3	S4
Material Groups	<a href="#">Page 7.7</a>	universal use			

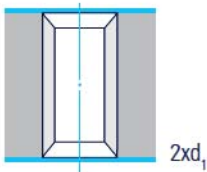
Ød <sub>1</sub>	P <sub>tpi</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□	🌀
No. 0	80	36	9,5	3	2,5	1,25
No. 1	72	36	9,5	3	2,5	1,55
No. 2	64	42	9,5	3	2,5	1,9
No. 3	56	44	9,5	3	2,5	2,1
No. 4	48	44	9,5	3	2,5	2,4
No. 5	44	46	9	4	3,2	2,5
No. 6	40	52	11	5	4	3,3
No. 8	36	52	11	5	4	3,3
No. 10	32	60	13	5,5	4,5	4,2
No. 12	28	60	13	5,5	4,5	4,2
1/4"	28	62	15	6	4,5	5
5/16"	24	70	22	6,1	5	6,9
3/8"	24	75	24	7	5,5	8,5
7/16"	20	80	25	8	6	9,9
1/2"	20	85	29	9	7	11,5
9/16"	18	90	30	10,5	8	12,9
5/8"	18	95	32	12	9	14,5
3/4"	16	105	37	14	11	17,5
7/8"	14	115	38	17	13	20,4
1"	12	125	45	20	15	23,25



DL (previous symbol PO)  
Spiral Pointed Taps  
Black Ring

JIS  
HSS-E/V3  
for universal use  
Recommended using CNC machine

Group C19A  
for through holes



Art.-No.		C19A/89 S1	C19A/89 S2	C19A/89 S3	C19A/89 S4
Technology	<a href="#">Page 7.1</a>	Black Ring spiral point	Black Ring spiral point	Black Ring spiral point	Black Ring spiral point
Chamfer Length	<a href="#">Page 7.4</a>	B / 3,5-5 x P			
Surface	<a href="#">Page 7.5</a>				
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S3	S4
Material Groups	<a href="#">Page 7.7</a>	universal use			

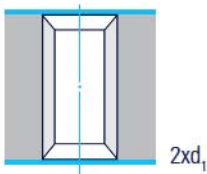
Ød <sub>1</sub>	P <sub>tpi</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□	🌀			
No. 0	80	36	9,5	3	2,5	1,25			
No. 1	72	36	9,5	3	2,5	1,55			
No. 2	64	42	9,5	3	2,5	1,9			
No. 3	56	44	9,5	3	2,5	2,1			
No. 4	48	44	9,5	3	2,5	2,4			
No. 5	44	46	9	4	3,2	2,5			
No. 6	40	52	11	5	4	3,3			
No. 8	36	52	11	5	4	3,3			
No. 10	32	60	13	5,5	4,5	4,2		●	
No. 12	28	60	13	5,5	4,5	4,2			
1/4"	28	62	15	6	4,5	5		●	
5/16"	24	70	22	6,1	5	6,9			●
3/8"	24	75	24	7	5,5	8,5			●
7/16"	20	80	25	8	6	9,9			
1/2"	20	85	29	9	7	11,5			●
9/16"	18	90	30	10,5	8	12,9			
5/8"	18	95	32	12	9	14,5			
3/4"	16	105	37	14	11	17,5			
7/8"	14	115	38	17	13	20,4			
1"	12	125	45	20	15	23,25			



## DL-OX (previous symbol PO-OX) Steam Oxide Spiral Pointed Taps Black Ring

JIS  
HSS-E/V3  
for universal use  
Recommended using CNC machine  
Recommended using oily cutting fluid  
for steam oxide products

Group C19A  
for through holes



Art.-No.		C19A/2689 S1	C19A/2689 S2	C19A/2689 S3	C19A/2689 S4
Technology	<a href="#">Page 7.1</a>	Black Ring spiral point	Black Ring spiral point	Black Ring spiral point	Black Ring spiral point
Chamfer Length	<a href="#">Page 7.4</a>	B / 3,5-5 x P			
Surface	<a href="#">Page 7.5</a>	steam oxidized	steam oxidized	steam oxidized	steam oxidized
Tolerance	<a href="#">Page 7.6</a>	S1	S2	S3	S4
Material Groups	<a href="#">Page 7.7</a>	universal use			

Ød <sub>1</sub>	P <sub>tpi</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□	🌀			
No. 0	80	36	9,5	3	2,5	1,25			
No. 1	72	36	9,5	3	2,5	1,55			
No. 2	64	42	9,5	3	2,5	1,9			
No. 3	56	44	9,5	3	2,5	2,1			
No. 4	48	44	9,5	3	2,5	2,4			
No. 5	44	46	9	4	3,2	2,5			
No. 6	40	52	11	5	4	3,3			
No. 8	36	52	11	5	4	3,3			
No. 10	32	60	13	5,5	4,5	4,2		●	
No. 12	28	60	13	5,5	4,5	4,2			
1/4"	28	62	15	6	4,5	5		●	
5/16"	24	70	22	6,1	5	6,9			●
3/8"	24	75	24	7	5,5	8,5			●
7/16"	20	80	25	8	6	9,9			
1/2"	20	85	29	9	7	11,5			
9/16"	18	90	30	10,5	8	12,9			
5/8"	18	95	32	12	9	14,5			
3/4"	16	105	37	14	11	17,5			
7/8"	14	115	38	17	13	20,4			
1"	12	125	45	20	15	23,25			

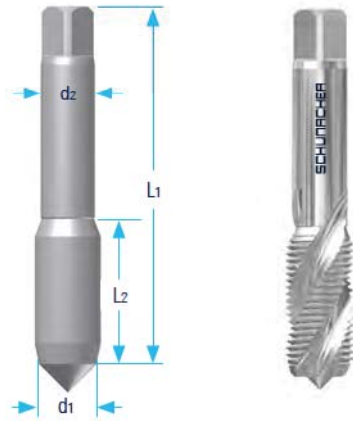
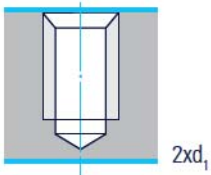
# PF - Whitworth Pipe Thread DIN ISO 228



PF SL (previous symbol PF SP)  
Pipe Tap Spiral Fluted Taps

JIS  
HSS-E/V3  
RH spiral flutes 30°  
for universal use  
Recommended using CNC machine

Group C30A  
for blind holes



Art.-No.		C30A/89	
Technology	<a href="#">i Page 7.1</a>	spiral flutes	
Chamfer Length	<a href="#">i Page 7.4</a>	C / 2-3 x P	
Surface	<a href="#">i Page 7.5</a>		
Tolerance	<a href="#">i Page 7.6</a>	JIS II	
Material Groups	<a href="#">i Page 7.7</a>	universal use	

ød <sub>1</sub>	P <sub>mm</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□				
PF 1/8"	28	55	19	8	6		●		
PF 1/4"	19	62	28	11	9		●		
PF 3/8"	19	65	28	14	11		●		
PF 1/2"	14	80	35	18	14		●		
PF 3/4"	14	85	35	23	17		●		
PF 1"	11	95	45	26	21		●		

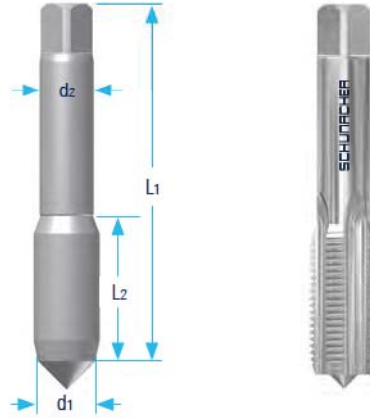
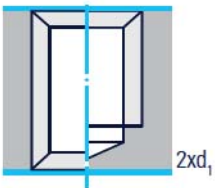




Under development  
Pipe Tap Straight Taps

JIS  
HSS-E/V3  
for universal use  
Recommended using CNC machine

Group C00A  
for blind and through holes



Art.-No.		C00A/89		
Technology	<a href="#">Page 7.1</a>	straight flutes		
Chamfer Length	<a href="#">Page 7.4</a>	C / 2-3 x P		
Surface	<a href="#">Page 7.5</a>			
Tolerance	<a href="#">Page 7.6</a>	JIS II		
Material Groups	<a href="#">Page 7.7</a>	universal use		

$\varnothing d_1$	P <sub>mm</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□	
PF 1/8"	28	55	19	8	6	
PF 1/4"	19	62	28	11	9	
PF 3/8"	19	65	28	14	11	
PF 1/2"	14	80	35	18	14	
PF 3/4"	14	85	35	23	17	
PF 1"	11	95	45	26	21	

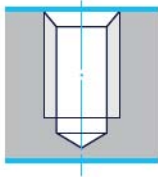
# BSPT - British Standard Tapered Pipe Thread DIN EN 10226-2, ISO 7-1



PT SL (previous symbol PT SP)  
Pipe Tap Spiral Fluted Taps

JIS  
HSS-E/V3  
RH spiral flutes 30°  
for universal use  
Recommended using CNC machine

Group C30A  
for blind holes



Art.-No.		C30A/89		
Technology	<a href="#">Page 7.1</a>	spiral flutes		
Chamfer Length	<a href="#">Page 7.4</a>	C / 2-3 x P		
Surface	<a href="#">Page 7.5</a>			
Tolerance	<a href="#">Page 7.6</a>	JIS II		
Material Groups	<a href="#">Page 7.7</a>	universal use		

Ød <sub>1</sub>	P <sub>mm</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□	🔩			
PT 1/8"	28	55	19	8	6	●			
PT 1/4"	19	62	28	11	9	●			
PT 3/8"	19	65	28	14	11	●			
PT 1/2"	14	80	35	18	14	●			
PT 3/4"	14	85	35	23	17	●			
PT 1"	11	95	45	26	21	●			

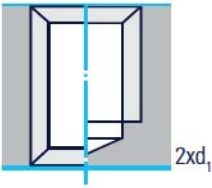




Under development  
Pipe Tap Straight Fluted Taps

JIS  
HSS-E/V3  
for universal use  
Recommended using CNC machine

Group C00A  
for blind and through holes



Art.-No.		C00A/89		
Technology	Page 7.1	straight flutes		
Chamfer Length	Page 7.4	C / 2-3 x P		
Surface	Page 7.5			
Tolerance	Page 7.6	ANSIG		
Material Groups	Page 7.7	universal use		

$\varnothing d_1$	P <sub>mm</sub>	L <sub>1</sub>	L <sub>2</sub>	d <sub>2</sub>	□	
NPT 1/8"	28	55	19	8	6	8,4
NPT 1/4"	19	62	28	11	9	11,1
NPT 3/8"	19	65	28	14	11	14,3
NPT 1/2"	14	80	35	18	14	17,9
NPT 3/4"	14	85	35	23	17	23,0
NPT 1"	11,5	95	45	26	21	29,0





## Schumacher's Technological Disciplines

Our core competences in tool development are prerequisites for industry-specific solutions:

**VHMtec**  
by Schumacher

Solid Carbide product line with internal coolant and outlets in the flutes

**PM-Line**  
by Schumacher

Product line from various PM substrates for sophisticated applications

**High Speed Cutting**  
by Schumacher

Product line with special hard material coatings and geometries developed for high speed cutting

**High Volume**  
by Schumacher

Product line with highly competitive pricing for large series

**Hard Steel**  
by Schumacher

Product line for hard machining with specialized tool design

**Special Solutions**  
by Schumacher

Due to the carefully tailored tool design (basic substrate, geometry, hard material coating), the parameters for using the tool and the continuous fine-tuning of the framework conditions, Schumacher engineers ensure an optimum performance.



## Technology

### Color Ring Line

The color ring line comprises machine taps from five different product groups which meet the requirements of highly sophisticated industries such as automotive, aerospace or chemicals. By their color marking, the appropriate use of these taps is facilitated. Selected hard material coatings increase the range of employment.

#### White-Line



Product line for grey cast iron

#### Red-Line



Product line for high strength heat treatable steel and nickel alloys

#### Blue-Line



Product line for use in INOX/stainless steel

#### Black-Line



Product line for general purpose „Black Power“

#### Yellow-Line



Product line for use in titanium alloys



# Technology

## Cutting Speeds

Definition of rotation and cutting speeds for threading tools.

The table below contains the calculated values of rotation and cutting speeds for threading tools between M 3 and M 42. In most cases these calculations will serve for workshop use in practice. If interim values should be required, these can be calculated by drawing upon the formulas listed below.

nominal diameter	round per minute [1/min]												
	4	5	6	8	10	12	15	20	22	25	28	30	32
M 3	425	530	635	850	1060	1270	1590	2120	2330	2650	2965	3180	3390
M 4	319	398	480	635	795	955	1190	1590	1750	1990	2230	2390	2550
M 5	255	318	382	510	635	765	955	1270	1400	1590	1785	1910	2040
M 6	212	265	318	425	530	635	795	1060	1170	1325	1485	1590	1700
M 8	159	198	238	318	398	478	598	795	875	995	1115	1195	1275
M 10	127	159	191	255	318	382	478	636	700	795	892	955	1020
M 12	106	133	159	212	265	318	398	531	584	664	744	795	850
M 14	91	114	136	182	228	273	342	455	500	568	636	682	728
M 16	80	100	119	159	199	239	299	398	438	497	557	597	637
M 18	71	88	106	142	177	212	265	354	388	442	495	530	565
M 20	64	80	95	127	159	192	239	318	350	398	446	478	510
M 22	58	72	87	116	145	174	217	290	318	362	405	435	463
M 24	53	66	80	106	133	159	200	266	292	332	372	398	425
M 27	47	59	71	95	118	142	177	236	260	295	330	355	378
M 30	42	53	64	85	106	127	159	212	234	265	297	318	340
M 33	39	48	58	77	96	116	145	193	212	242	270	290	309
M 36	35	44	53	71	88	106	133	177	195	221	248	265	283
M 39	33	41	49	65	82	98	122	163	180	205	228	245	262
M 42	30	38	45	61	76	91	114	152	167	190	212	228	243
	4	5	6	8	10	12	15	20	22	25	28	30	32
	Cutting speed v [m/min]												

legend:

- v = Cutting speed [m/min]
- d = Nominal tap diameter [m]
- n = Tool spindle rotation [1/min]
- $\pi = 3,14$



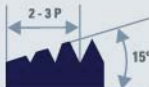
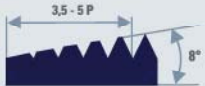
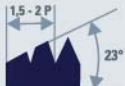
$$v = d \times \pi \times n$$

$$n = \frac{v}{d \times \pi}$$

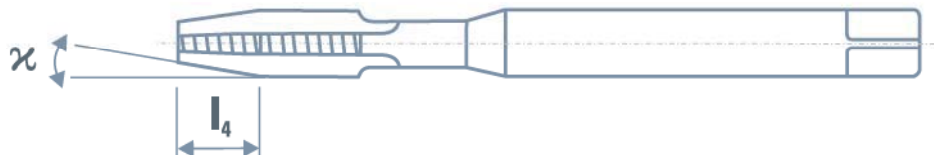


# Technology

## Chamfer Form

Form	Chamfer length $l_4$ <sup>1)</sup> [x pitch]	Chamfer angle $\alpha$ [°]	Main field of application:	
A	6 to 8	5°	short through holes	
B	3,5 to 5	8°	through holes in mid and long chipping materials	
C	2 to 3	15°	blind holes and through holes in short chipping materials	
D	3,5 to 5	8°	blind holes with long thread run-out and through holes	
E	1,5 to 2	23°	blind holes with very short thread run-out	

<sup>1)</sup> The number of pitches is a simple, practice-oriented criterion for defining the chamfer length of taps







## Hard Material Coatings

Technologies for hard materials coatings of HSS- and solid carbide tools are increasingly important since they bring about advantages such as:

- an increase in tool life
- a reduction of set-up times and a substantial
- increase of working speeds

These factors justify the extra expenditures compared to tools without hard coatings.

### TiN Coating

Allround coating designed to improve tool life and optimize cutting speed. With a surface hardness of 2600 HV0.05 and a frictional coefficient of 0.40 this coating can be applied in working temperatures of up to 450°C. The thickness of the layer ranges between 2 - 4 µm. TiN coatings have an internal compressive stress of approx. 3.1 GPa.



### TiCN Coating

Improved tribological characteristics compared to TiN. Micro hardness at 3000 HV0.05; frictional coefficient reduced to 0.35 compared to steel. Temperature stability of TiCN layers (thickness of 2 - 4 µm) extends up to 350°C. Internal compressive stress is at 3.5 GPa.



### TiAlN Coating

Optimized PVD layer system, for hard materials of up to 50 HRC. Enhanced range of employment due to temperature stability up to 800 °C and micro hardness of 3000 HV0.05. This layer system features an oxidizing protection layer which provides the tool with a 'renewal effect.' Internal compressive stress of 1.9 GPa. The coating system is applied with a layer thickness of 2-4 µm.



### SG4 Coating

Special coating made of super hard coating layer and solid state lubrication layer. Sectors of use comprise dry cutting and minimum lubrication. Wide range of applications due to optimum friction results and reduced tendency of adhesion.

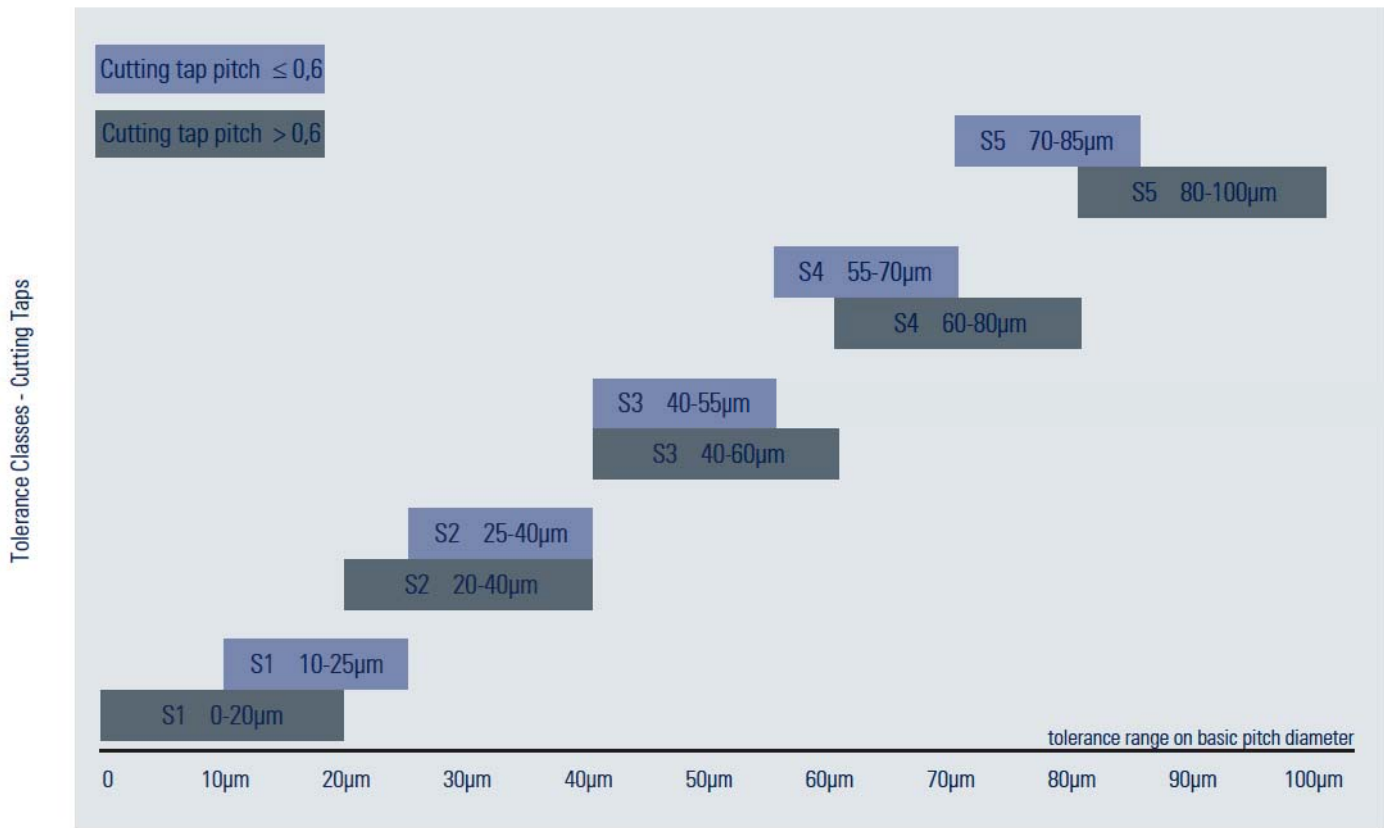




# Technology

## Tolerances

Schematic description of production tolerances applicable for metric internal thread – in addition please also find below the specific tolerance fields for tap production





# Technology

## Material Groups

$$V_c \text{ [m/min.]}$$

$$V_{c \text{ Forming Taps}} = V_c + 30-50\%$$

HSS-E  
VHM

bright

coated

Description

DIN 17 007  
Material-No.

Strength [N/mm<sup>2</sup>]

1. Steel					
1a. General construction steel					
	10-15	15-25	St 33	1.0035	290
	10-15	15-25	St 37	1.0120	340-370
	10-15	15-25	St 50	1.0531	470-610
	10-15	15-25	St 60-2	1.0060	570-710
	10-15	15-25	St 70-2	1.0070	670-830
1a. Cementation steel					
	10-15	15-25	C 15	1.0401	600-800
	10-15	15-25	Ck 15	1.1141	500-800
	10-15	15-25	20 Mn Cr 5	1.7147	1000-1300
	2-5	5-10	17 Cr Ni Mo 6	1.6587	1050-1350
1a. Heat-treatable steel					
	10-15	15-25	C 45	1.0503	650-800
	10-15	15-25	C 60	1.0601	800-850
	2-5	5-10	46 Cr 2	1.7003	700-850
	2-5	5-10	25 Cr Mo 4	1.7218	800-950
	2-5	5-10	30 Cr Ni Mo 8	1.6580	1250-1450
1b. Tool steel					
<i>Cold work steel</i>	8-10	10-15	21 MnCr 5	1.2162	
	8-10	10-15	105 WCr 6	1.2419	
	8-10	10-15	X 45 Ni Cr Mg	1.2767	
<i>Hot work steel</i>	8-10	10-15	55 Ni Cr Mo V 6	1.2713	
	8-10	10-15	X 40 Cr Mo V 51	1.2344	
1b. Nitriding steel					
	3-5	5-8	31 Cr Mo 1 2	1.8515	1000-1200
	3-5	5-8	34 Cr Al Mo 5	1.8505	800-950
	3-5	5-8	34 Cr Al Ni 7	1.8898	850-1050
1b. Free-cutting steel					
	10-15	15-25	9 S 20 K	1.0711	360
	10-15	15-25	9 S Mn Pb 28	1.0718	380
	10-15	15-25	35 S 20	1.0726	490-610
1b. Heat-resistant steel					
	3-5	5-8	X 10 Cr Si 13	1.4711	
	3-5	5-8	X 15 Cr Ni Si 20 12	1.4828	
	3-5	5-8	X 20 Cr Mo V 21		
1b. Cast steel					
	10-15	15-25	GS 45	1.0443	440
	10-15	15-25	GS 60	1.0553	590
	10-15	15-25	GS 70	1.0554	685



# Technology

## Material Groups

$$V_c \text{ [m/min.]}$$

$$V_{c \text{ Forming Taps}} = V_c + 30-50\%$$

HSS-E  
VHM

bright

coated

Description

DIN 17 007  
Material-No.

Strength [N/mm<sup>2</sup>]

### 2. Chemical resistant steel

#### Ferrited steel

3-5	5-8	X 6 Cr 13	1.4000	400-600
3-5	5-8	X 4 Cr Mo S 18	1.4105	450-650

#### Martensitic steel

3-5	5-8	X 30 Cr 13	1.4028	800-1000
3-5	5-8	X 12 Cr Mo S 17	1.4104	600-840

#### Austenitic steel

3-5	5-8	X 5 Cr Ni 18,10	1.4301	500-700
3-5	5-8	X 6 Ni Mo Ti 17, 12.2	1.4571	500-730
3-5	5-8	X 2 Cr Ni Mo 18, 14.3	1.4435	490-690

#### Sulphurated

3-5	5-8	X 10 Cr Ni S 18,9	1.4305	
-----	-----	-------------------	--------	--

#### Cast steel

3-5	5-8	G-X 6 Cr Ni Mo 18,10	1.4408	440-640
3-5	5-8	G-X 3 Cr Ni Mo N 17, 13.5	1.4439	490-690

### 3. Grey cast iron

#### 3a. Lamellar graphite

8-12	25-30	12-20	GG 10	0.6010	88
8-12	25-30	12-20	GG 20	0.6020	195
8-12	25-30	12-20	GG 30	0.6030	295
8-12	25-30	12-20	GG 40	0.6040	390

#### 3b. Spheroidal graphite

5-8	8-12	GGG 40	0.7040	400
5-8	8-12	GGG 50	0.7045	500
5-8	8-12	GGG 60	0.7060	600

#### 3b. Malleable cast iron (white)

10-15	15-20	GTW 40	0.8040	400
10-15	15-20	GTW 45	0.8045	450
10-15	15-20	GTW 55	0.8055	550

#### 3b. Malleable cast iron (black)

10-15	15-20	GTS 35	0.8135	350
10-15	15-20	GTS 45	0.8145	450
10-15	15-20	GTS 55	0.8155	550





# Technology

## Material Groups

$$V_c \text{ [m/min.]}$$

$$V_{c \text{ Forming Taps}} = V_c + 30-50\%$$

HSS-E  
VHM

bright

coated

Description

DIN 17 007  
Material-No.

Strength [N/mm<sup>2</sup>]

4. Titanium					
Pure titanium					
	2-4	4-6	Ti	99.5	3.7024,1
	2-4	4-6	Ti	99.4	37.055
Titanium alloys					
	2-4	4-6	Ti Al 5 Sn 2	3.7114	840-990
	2-4	4-6	Ti Al 6 V 4	3.7165	910-1100
5. Nickel					
Pure nickel					
	2-4	4-6	Ni 99,6	2.4060	370-590
	2-4	4-6	Ni 99,2	2.4068	340-540
Nickel alloys					
	2-4	4-6	Monet 400	2.4360	
	2-4	4-6	Hasteloy	2.4812	
	2-4	4-6	Inconel 600	2.4816	
	2-4	4-6	Nimonic 90		
6. Copper					
Copper alloys					
	10-15	15-20	E-Cu	2.0060	300-400
	10-15	15-20	SE-Cu	2.0070	
Bronze					
	10-15	15-20	G Cu Pb 5 Sn (Hg 5)	2.1170	240
	10-15	15-20	Cu Sn 6 (Hg 7)	2.1030	400-550
	10-15	15-20	G Cu Sn 10 Zn (Hg 10)	2.1176	230
Brass					
<i>short chipping</i>	20-25 <b>30-50</b>	25-35	Cu Zn 39 Pb 2 (MS 58)	2.0380	450-550
<i>short chipping</i>	20-25 <b>30-50</b>	25-35	Cu Zn 40 A 2	2.0550	550-640
<i>long chipping</i>	20-25 <b>30-50</b>	25-35	Cu Zn 30	2.0265	400-500
Special alloys					
	2-4	4-6	Ampco 18		1000-1200
	2-4	4-6	Ampco 20		1300-1500
	2-4	4-6	Ampco 25		1300-1500



# Technology

## Material Groups

$V_c$  [m/min.]  
 $V_{c \text{ Forming Taps}} = V_c +30-50\%$   
**HSS-E**  
**VHM**  
 bright | coated

Description

DIN 17 007  
Material-No.

Strength [N/mm<sup>2</sup>]

### 7. Aluminium / Magnesium

#### Aluminium wrought alloys < 0,5% Si

	20-25	25-35	Al Mn 1	3.0515	150-200
	20-25	25-35	Al Mg 3	3.3535	200-300
	20-25	25-35	Al Mg Si Pb	3.0615	200-270
	20-25	25-35	Al Zn 4,5 Mg 1	3.4335	

#### Aluminium cast alloys

	20-30	30-40	G-Al Si 10 Mg	3.2381	250-320
	20-30	30-40	G-Al Mg 3	3.3541	140-200
	20-30	30-40	G-Al Cu 4	3.1841	280-400

#### Magnesium alloys

		15-20	AZ 91		
--	--	-------	-------	--	--

### 8. Plastics

#### 8a. Thermoplastics

##### long chipping

	20-30	30-40	Hostalen		300-400
	20-30	30-40	Makrolon		
	20-30	30-40	PS Polystyrol		
	20-30	30-40	POM Polymethylen		240
	20-30	30-40	PVC Polyvenylchlorid		400-550
	20-30	30-40	PA Polyamid		230

#### 8b. Duroplastics

##### short chipping

	3-5	5-8	Bakelit		450-550
	3-5	5-8	Pertinax		550-640
	3-5	5-8	Ferrozell		400-500
	3-5	5-8	Resopal		

### 9. Hard Materials

#### Hard Materials – short chipping

	<b>6-8</b>	2-4	bis 50 HRC		
	<b>2-4</b>		bis 62 HRC		
	<b>2-4</b>		bis 70 HRC		



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