

hard material matters



## MSS-AX – Axial grooving <math>< 50\text{ mm}</math>

EN



# CERATIZIT - secrets of success

## Secrets of success

- CERATIZIT is your partner for exceptional hard material solutions. Hard materials and tools from CERATIZIT - our solutions to complex problems are an integral part of our customers' success. Our products guarantee: economy - long life - speed! And it is precisely this combination which gives our business partners a direct competitive advantage.
- Premier performance is only possible through a total appreciation of the requirements of our business partners. A performance achieved through flexible thinking and continuous dialogue with our customers. A pioneering spirit and a deep understanding of powder metallurgy characterize the history of CERATIZIT. One of the attributes of our company philosophy is the search for perfection: target oriented - sustainably - passionately!
- Intensive research and development activities, taking into account the precise requirements and working processes of the customer, are today's investment for the solutions of tomorrow - and beyond.

## Corporate values

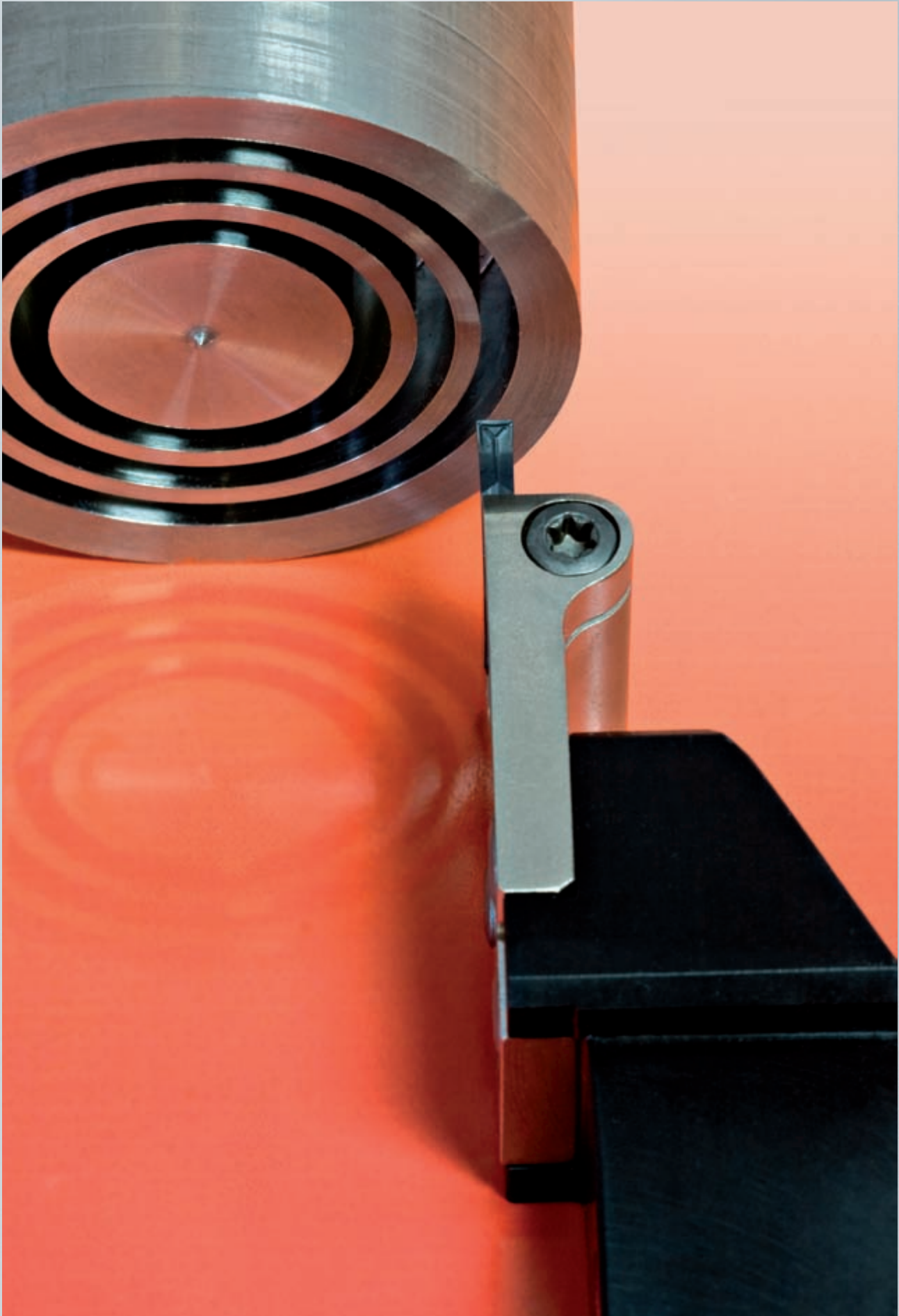
- 1 The views and focus of our business partners matter
- 2 Innovative and flexible thinking matters
- 3 Communication matters
- 4 Employee development matters
- 5 Professionalism matters
- 6 Our environment matters



## Tailored cutting tool solutions

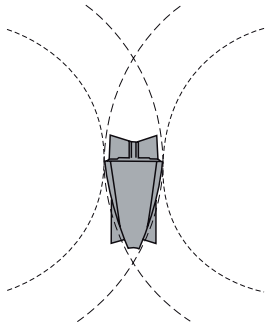
- Cutting materials, coatings, inserts, tooling systems and machining solutions - all this is included in the cutting tool division at CERATIZIT.
- Worldwide well-known companies process advanced materials applying cutting tool products from CERATIZIT: from the automotive industry to the aerospace industry, mechanical engineering, and tool construction to the oil industry.
- The basis of these long-term business relations is the faith of the customers in the extensive know-how of the carbide specialists.

## Axial grooving <math>< 50\text{ mm}</math>



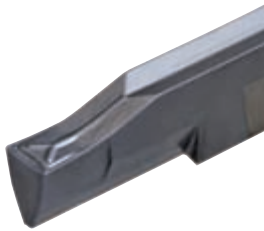
# MSS-AX

## Product characteristics, customer benefit



### Neutral insert

- May be applied in left-hand and right-hand tools
- Application is independent on the groove diameter (tool position is possible in x+ or x-)
- Only limited by  $D_{\min}$  for first grooving operation



### Geometry –F50

- Universal application, suitable for all materials
- Suitable for grooving and turning



### Tools provided with 'hard & tough' coating

- Maximum wear protection
- Maximum corrosion resistance

### Monobloc and modular tools

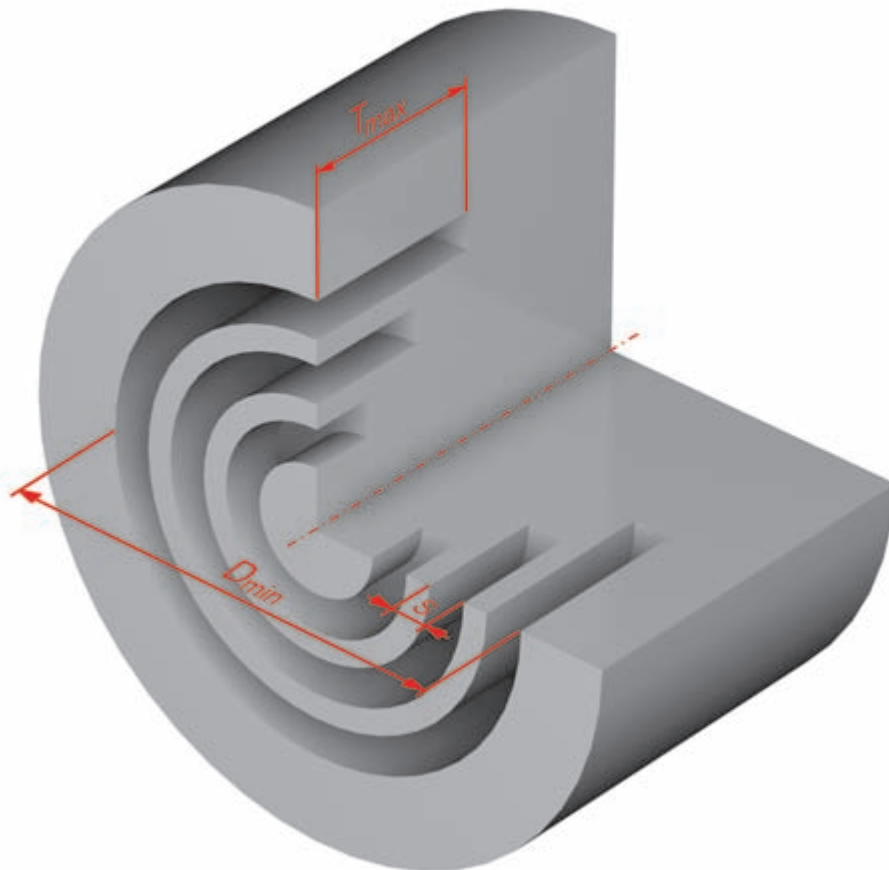
- High flexibility
- Cost-optimized solution for every application



# MSS-AX

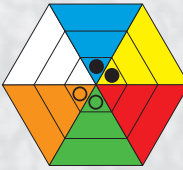
## Application range

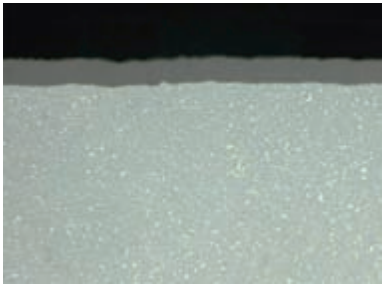
	AX05	AX10	AX15
$D_{\min} - D_{\max}$	10 - $\infty$	20 - $\infty$	30 - $\infty$
$T_{\max}$	5,0	10,0	15,0
S	3,0	3,0	3,0



# Grade description

**CTP1340**  
 HC-P40  
 HC-M35  
 HC-K25






**Composition:**  
Co 9.0%; WC rest

**Grain size:**  
0.7 - 1  $\mu\text{m}$

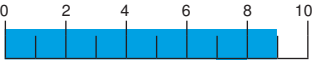
**Hardness:**  
HV 1590

**Coating specification:**  
PVD  
TiAlN; 4  $\mu\text{m}$

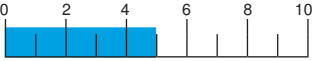
**Steel**



**Toughness**



**Wear resistance**



**Stainless**




**Toughness**




**Wear resistance**



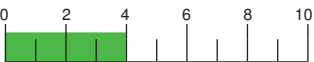
**Non ferrous metals**




**Toughness**



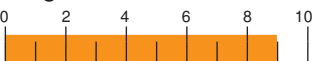
**Wear resistance**



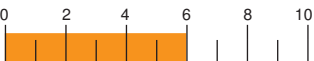
**Heat resistant**



**Toughness**



**Wear resistance**



# Inserts

## MSS AX system

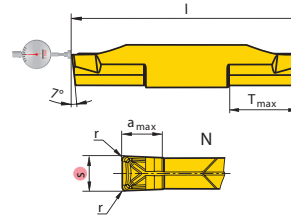


-F50

s [mm]	Type, description	LNR	CTP1340						T <sub>max</sub> [mm]	l [mm]	r [mm]	a <sub>max</sub> [mm]
3,00	AX05-E3.00N0.30-10-F50	N	●						5,0	24,0	0,30	1,7
3,00	AX10-E3.00N0.30-20-F50	N	●						10,0	34,0	0,30	1,5
3,00	AX15-E3.00N0.30-30-F50	N	●						15,0	44,0	0,30	1,0



Steel	●						
Stainless	●						
Cast iron	●						
Non ferrous metals	○						
Heat resistant	○						
Hard materials							



- Main application
- Extended application
- International CERATIZIT range, for present availability see price list

Ordering example: 3 pieces AX05-E3.00N0.30-10-F50 CTP1340

= repeatability ( x ) see below

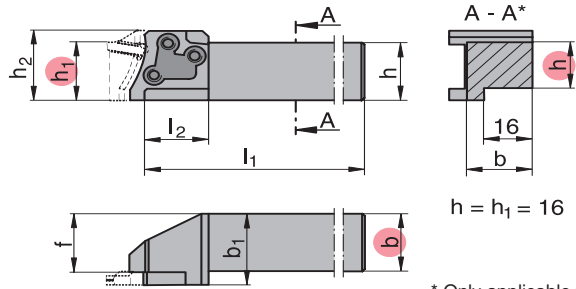
Tolerances [mm]			
	x	s	r
-F50	± 0,02	± 0,02	± 0,05




# Tools

## Modular system (MSS)




### Shank 0°

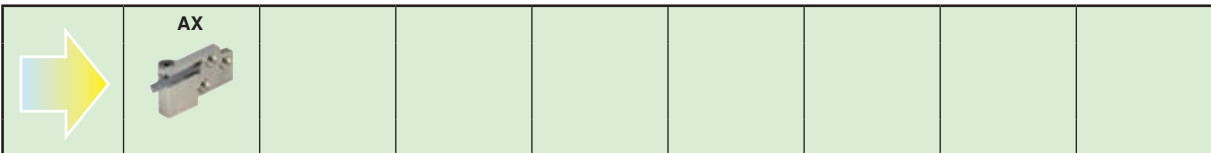


Bgr:	Type, description	L N R	h = h <sub>1</sub>		f [mm]	b <sub>1</sub> [mm]	h <sub>2</sub> [mm]	l <sub>1</sub> [mm]	l <sub>2</sub> [mm]	
			[mm]	[mm]						
16	MSS-E16R00-1616G	R	16	16	15,75	19,25	19,5	90	16	MSS-E16R..
20	MSS-E20R00-1620G	R	16	20	20,15	24,25	24,0	90	20	MSS-E20R..
20	MSS-E20R00-2020J	R	20	20	20,15	24,25	24,0	110	20	MSS-E20R..
25	MSS-E25R00-2525L	R	25	25	25,50	31,00	30,0	140	25	MSS-E25R..
16	MSS-E16L00-1616G	L	16	16	15,75	19,25	19,5	90	16	MSS-E16L..
20	MSS-E20L00-1620G	L	16	20	20,15	24,25	24,0	90	20	MSS-E20L..
20	MSS-E20L00-2020J	L	20	20	20,15	24,25	24,0	110	20	MSS-E20L..
25	MSS-E25L00-2525L	L	25	25	25,50	31,00	30,0	140	25	MSS-E25L..

Ordering example: 1 piece MSS-E20R00-2020J

**Bgr.** = assembly size

 h [mm]		
16	7897202/M3,5X12,5/T15	7897208/TORX T15 T
20	7897203/M4,0X14/T15	7897208/TORX T15 T
25	7897205/M5,0X18/T20	7897207/TORX T20 T

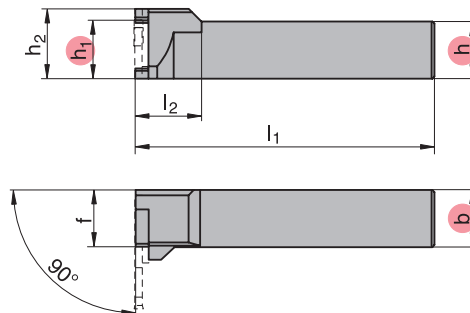




# Tools

## Modular system (MSS)

### Shank 90°



Bgr:	Type, description	L N R	h = h <sub>1</sub> [mm]	b [mm]	f [mm]	h <sub>2</sub> [mm]	l <sub>1</sub> [mm]	l <sub>2</sub> [mm]	
20	MSS-E20R90-2020J	R	20	20	20,00	24,0	110	20	MSS-E20L..
25	MSS-E25R90-2525L	R	25	25	25,00	30,0	140	28	MSS-E25L..
20	MSS-E20L90-2020J	L	20	20	20,00	24,0	110	20	MSS-E20R..
25	MSS-E25L90-2525L	L	25	25	25,00	30,0	140	28	MSS-E25R..

Ordering example: 1 piece MSS-E20R90-2020J

Bgr. = assembly size

 h [mm]			
20	7897203/M4,0X14/T15	7897208/TORX T15 T	
25	7897205/M5,0X18/T20	7897207/TORX T20 T	



#### In case of 90°:

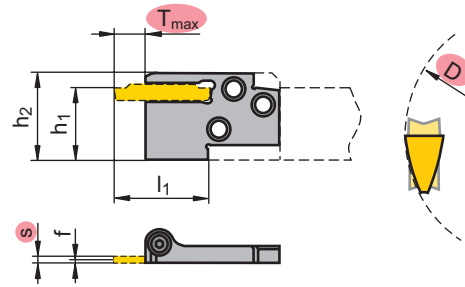
Right-hand shank - left-hand module  
Left-hand shank - right-hand module


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# MSS modules – ext.

## Axial grooving - AX system

AX






Bgr.	Type, description	L N R	s [mm]	T <sub>max</sub> [mm]	D [mm]	f [mm]	h <sub>1</sub> [mm]	h <sub>2</sub> [mm]	l <sub>1</sub> [mm]	
16	MSS-E16R05-AX05	R	3,00	5	10 – ∞	2,50	16	20,5	24,0	AX05
20	MSS-E20R05-AX05	R	3,00	5	10 – ∞	3,10	20	25,0	28,0	AX05
20	MSS-E20R10-AX10	R	3,00	10	20 – ∞	3,10	20	25,0	33,0	AX10
20	MSS-E20R15-AX15	R	3,00	15	30 – ∞	3,10	20	25,0	44,0	AX15
25	MSS-E25R05-AX05	R	3,00	5	10 – ∞	4,60	25	30,0	27,5	AX05
25	MSS-E25R10-AX10	R	3,00	10	20 – ∞	4,60	25	30,0	32,5	AX10
25	MSS-E25R15-AX15	R	3,00	15	30 – ∞	4,60	25	30,0	43,5	AX15
16	MSS-E16L05-AX05	L	3,00	5	10 – ∞	2,50	16	20,5	24,0	AX05
20	MSS-E20L05-AX05	L	3,00	5	10 – ∞	3,10	20	25,0	28,0	AX05
20	MSS-E20L10-AX10	L	3,00	10	20 – ∞	3,10	20	25,0	33,0	AX10
20	MSS-E20L15-AX15	L	3,00	15	30 – ∞	3,10	20	25,0	44,0	AX15
25	MSS-E25L05-AX05	L	3,00	5	10 – ∞	4,60	25	30,0	27,5	AX05
25	MSS-E25L10-AX10	L	3,00	10	20 – ∞	4,60	25	30,0	32,5	AX10
25	MSS-E25L15-AX15	L	3,00	15	30 – ∞	4,60	25	30,0	43,5	AX15

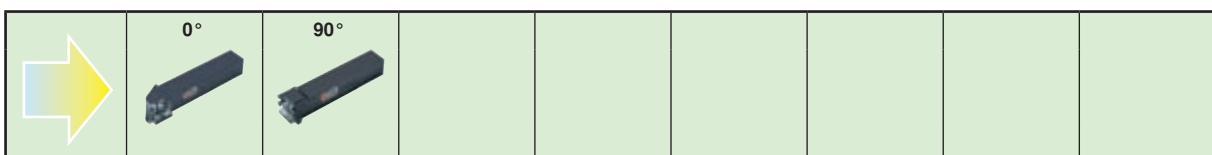
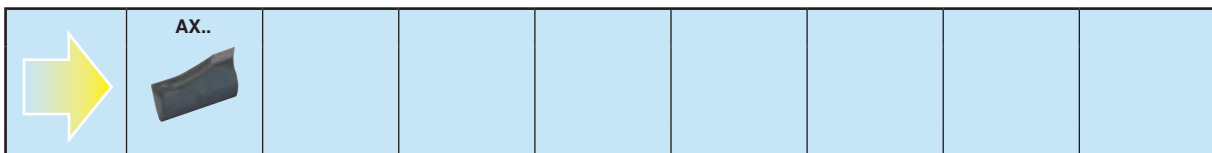
Ordering example: 1 piece MSS-E16R05-AX05

Bgr. = assembly size



For recommended torque moments see page 18

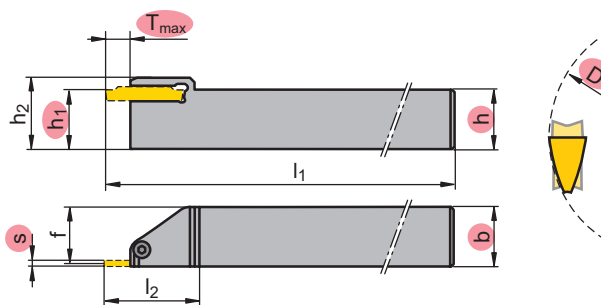
 h <sub>1</sub> [mm]		
16	7897202/M3,5X12,5/T15	7897208/TORX T15 T
20	7897203/M4,0X14/T15	7897208/TORX T15 T
25	7897205/M5,0X18/T20	7897207/TORX T20 T



# Tools

## Monobloc tool holders - AX system

### AX monobloc tool holder 0°



Type, description	LNR						D [mm]	h <sub>2</sub> [mm]	l <sub>1</sub> [mm]	l <sub>2</sub> [mm]	f [mm]	
		h = h <sub>1</sub> [mm]	b [mm]	s [mm]	T <sub>max</sub> [mm]							
E16R0005-1616L-AX05	R	16	16	3,00	5	10 - ∞	21,0	140	28,00	14,70	AX05	
E16R0010-1616L-AX10	R	16	16	3,00	10	20 - ∞	21,0	140	38,00	14,70	AX10	
E20R0005-2020L-AX05	R	20	20	3,00	5	10 - ∞	25,0	140	28,00	18,70	AX05	
E20R0010-2020L-AX10	R	20	20	3,00	10	20 - ∞	25,0	140	38,00	18,70	AX10	
E20R0015-2020L-AX15	R	20	20	3,00	15	30 - ∞	25,0	140	49,00	18,70	AX15	
E25R0005-2525N-AX05	R	25	25	3,00	5	10 - ∞	30,0	160	28,00	23,70	AX05	
E25R0010-2525N-AX10	R	25	25	3,00	10	20 - ∞	30,0	160	38,00	23,70	AX10	
E25R0015-2525N-AX15	R	25	25	3,00	15	30 - ∞	30,0	160	49,00	23,70	AX15	
E16L0005-1616L-AX05	L	16	16	3,00	5	10 - ∞	21,0	140	28,00	14,70	AX05	
E16L0010-1616L-AX10	L	16	16	3,00	10	20 - ∞	21,0	140	38,00	14,70	AX10	
E20L0005-2020L-AX05	L	20	20	3,00	5	10 - ∞	25,0	140	28,00	18,70	AX05	
E20L0010-2020L-AX10	L	20	20	3,00	10	20 - ∞	25,0	140	38,00	18,70	AX10	
E20L0015-2020L-AX15	L	20	20	3,00	15	30 - ∞	25,0	140	49,00	18,70	AX15	
E25L0005-2525N-AX05	L	25	25	3,00	5	10 - ∞	30,0	160	28,00	23,70	AX05	
E25L0010-2525N-AX10	L	25	25	3,00	10	20 - ∞	30,0	160	38,00	23,70	AX10	
E25L0015-2525N-AX15	L	25	25	3,00	15	30 - ∞	30,0	160	49,00	23,70	AX15	

Ordering example: 1 piece E16R0005-1616L-AX05



For recommended torque moments see page 18

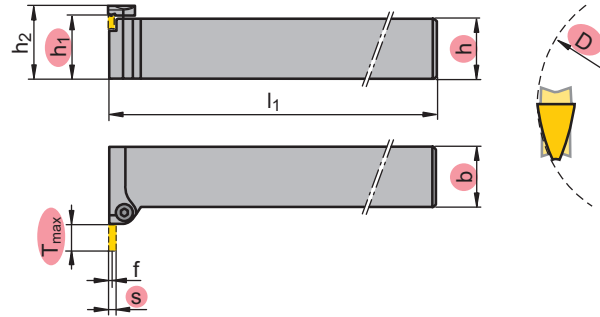
	h [mm]		
AX05	16	7897203/M4,0X14/T15	7897208/TORX T15 T
AX05	20 - 25	7897205/M5,0X18/T20	7897207/TORX T20 T
AX10	16	7897203/M4,0X14/T15	7897208/TORX T15 T
AX10	20 - 25	7897205/M5,0X18/T20	7897207/TORX T20 T
AX15	20 - 25	7897205/M5,0X18/T20	7897207/TORX T20 T

AX..							

# Tools

## Monobloc tool holders - AX system

### AX monobloc tool holder 90°



Type, description	LNR	h = h <sub>1</sub> [mm]	b [mm]	s [mm]	T <sub>max</sub> [mm]	D [mm]	h <sub>2</sub> [mm]	l <sub>1</sub> [mm]	l <sub>2</sub> [mm]	f [mm]	
E16R9005-1616J-AX05	R	16	16	3,00	5	10 - ∞	21,0	110	16,00	28,00	AX05
E16R9010-1616J-AX10	R	16	16	3,00	10	20 - ∞	21,0	110	16,00	38,00	AX10
E20R9005-2020J-AX05	R	20	20	3,00	5	10 - ∞	25,0	110	16,00	28,00	AX05
E20R9010-2020J-AX10	R	20	20	3,00	10	20 - ∞	25,0	110	13,90	38,00	AX10
E20R9015-2020J-AX15	R	20	20	3,00	15	30 - ∞	25,0	110	13,90	49,00	AX15
E25R9005-2525L-AX05	R	25	25	3,00	5	10 - ∞	30,0	140	16,00	33,00	AX05
E25R9010-2525J-AX10	R	25	25	3,00	10	20 - ∞	30,0	110	13,90	43,00	AX10
E25R9010-2525L-AX10	R	25	25	3,00	10	20 - ∞	30,0	140	13,90	43,00	AX10
E25R9015-2525L-AX15	R	25	25	3,00	15	30 - ∞	30,0	140	13,90	49,00	AX15
E16L9005-1616J-AX05	L	16	16	3,00	5	10 - ∞	21,0	110	16,00	28,00	AX05
E16L9010-1616J-AX10	L	16	16	3,00	10	20 - ∞	21,0	110	16,00	38,00	AX10
E20L9005-2020J-AX05	L	20	20	3,00	5	10 - ∞	25,0	110	16,00	28,00	AX05
E20L9010-2020J-AX10	L	20	20	3,00	10	20 - ∞	25,0	110	13,90	38,00	AX10
E20L9015-2020J-AX15	L	20	20	3,00	15	30 - ∞	25,0	110	13,90	49,00	AX15
E25L9005-2525L-AX05	L	25	25	3,00	5	10 - ∞	30,0	140	16,00	33,00	AX05
E25L9010-2525J-AX10	L	25	25	3,00	10	20 - ∞	30,0	110	13,90	43,00	AX10
E25L9010-2525L-AX10	L	25	25	3,00	10	20 - ∞	30,0	140	13,90	43,00	AX10
E25L9015-2525L-AX15	L	25	25	3,00	15	30 - ∞	30,0	140	13,90	49,00	AX15

Ordering example: 1 piece E16R9005-1616J-AX05



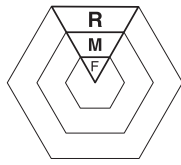
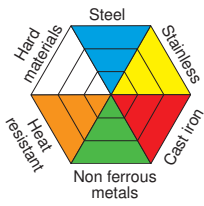
For recommended torque moments see page 18








	h [mm]		
AX05	16 - 25	7897203/M4,0X14/T15	7897208/TORX T15 T
AX10	16	7897203/M4,0X14/T15	7897208/TORX T15 T
AX10	20 - 25	7897205/M5,0X18/T20	7897207/TORX T20 T
AX15	20 - 25	7897205/M5,0X18/T20	7897207/TORX T20 T

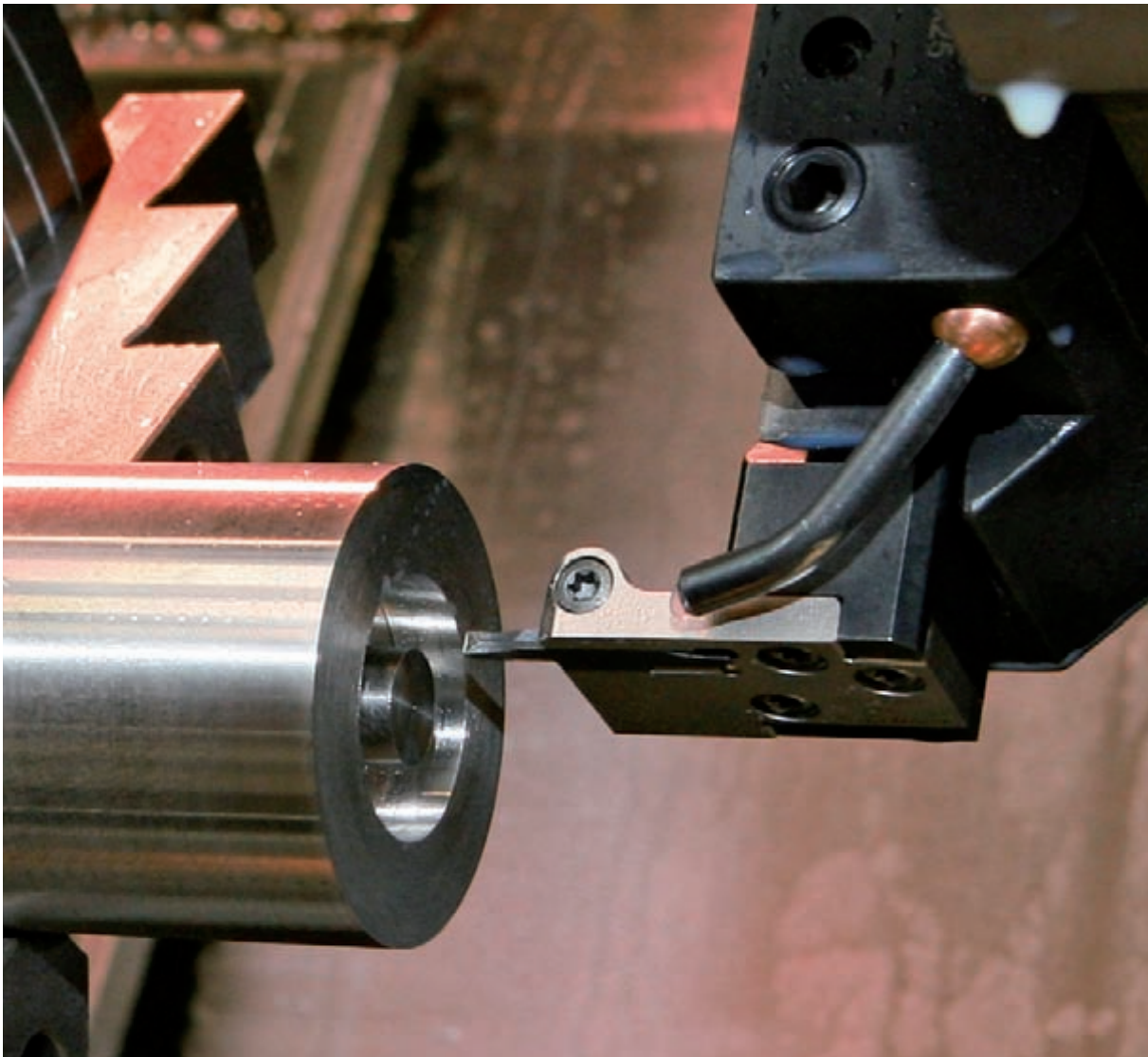
	AX..							
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# The easy way to success

## Axial grooving



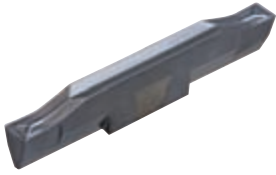
Geometry	Machining type	Material	Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
-F50 			CTP1340	CTP1340	-
			CTP1340	CTP1340	-
			-	-	-
			CTP1340	CTP1340	-
			CTP1340	-	-



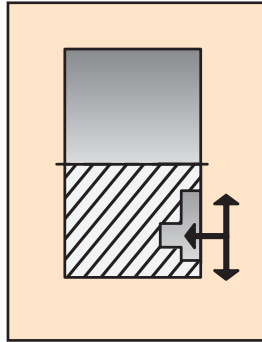
# The easy way to success

## Application

**-F50**

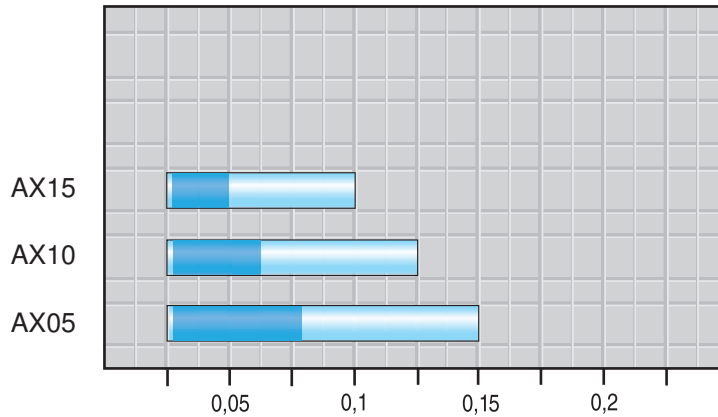
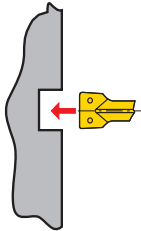


**Application:**



- Universal geometry for:
  - **Steel**
  - **Stainless steel**
  - Cast iron
  - Non ferrous metals
- Ground cutting edge

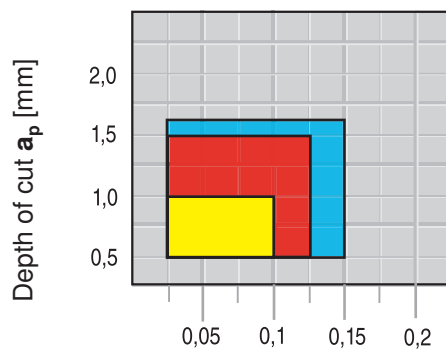
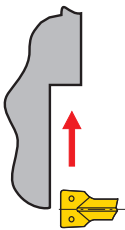
### Feed rate for axial grooving



Feed rate  $f$  [mm/rev]

- ... feed rate  $f$
- ... feed rate  $f$  for first grooving operation

### Feed rate for face turning



$a_p$   
[mm]

Feed rate  $f$  [mm/rev]

Cutting width  $s$ :

- = AX15
- = AX10
- = AX05

# The easy way to success

## Application

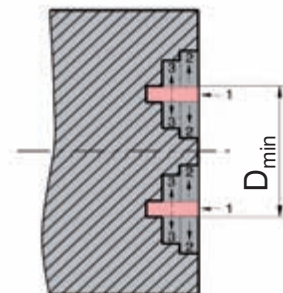
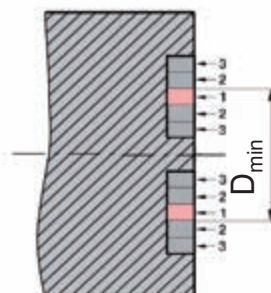
- ➔ When axial grooving short chipping swarf is evacuated more efficiently from deep grooves.
- ➔ Normally the following applies: use low feed rate when grooving → spiral chips. Adjust feed rate accordingly to achieve the desired short chipping swarf.
- ➔ When face turning or ramping increase feed rate after first grooving operation so that short chips are produced.
- ➔ When grooving to the maximum depth of the insert, always position the tool holder to achieve the smallest possible overhang.
- ➔ Ensure the insert edge is on the centre-line.

## Axial grooving and face turning



First groove must not be smaller than  $D_{\min}$ .

Groove widening is possible through grooving and face turning.



Axial grooving – groove widening

Axial grooving and face turning

# Cutting data

## Grades / materials

Work piece material		Type of treatment / alloy		VDI 3323 group	Hardness HB
A	Non alloyed steel	annealed	≤ 0,15% C	1	125
		annealed	0,15% - 0,45% C	2	150 - 250
		tempered	≥ 0,45% C	3	300
	Low alloyed steel	annealed		6	180
		tempered		7 / 8	250 - 300
		tempered		9	350
	High alloyed steel	annealed		10	200
		tempered		11	350
	Stainless steel	annealed	ferritic	12	200
		tempered	martensitic	13	325
R	Stainless steel	annealed	ferritic / martensitic	14	200
		quenched	austenitic	14	180
		quenched	duplex	14	230 - 260
		hardened	martensitic / austenitic	14	330
F	Grey cast iron		pearlitic / ferritic	15	180
			pearlitic / martensitic	16	260
	Spheroidal cast iron		ferritic	17	160
			pearlitic	18	-
	Malleable cast iron		ferritic	19	130
			pearlitic	20	230
N	Aluminium wrought alloys	non hardened		21	60
		hardened		22	100
	Aluminium cast alloys	non hardened	< 12% Si	23	80
		hardened	< 12% Si	24	90
		non hardened	> 12% Si	25	130
	Copper and copper alloys (bronze, brass)		machining alloy stock (1% Pb)	26	-
			brass, red bronze	27	90
			bronze	28	100
			lead-free copper and electrolytic copper	29	100
	Non-metallic materials		thermosetting plastics	29	-
			fibre reinforced plastics	29	-
			hard rubber	30	-
	S	Heat resistant alloys	annealed	Fe base	31
hardened			Fe base	32	280
annealed			Ni or Co base	33	250
hardened			Ni or Co base 30 - 58 HRC	34	-
cast			Ni or Co base 1500 - 2200 Nmm <sup>2</sup>	35	-
Titanium alloys			Ni or Co base	36	R <sub>m</sub> 440*
			alpha + beta alloys	37	R <sub>m</sub> 1050*
H	Tempered steel	hardened and tempered		38	55 HRC
		hardened and tempered		39	60 HRC
	Chilled castings	cast		40	400
	Tempered cast iron	hardened and tempered		40	55 HRC

\* R<sub>m</sub> = ultimate tensile strength, measured in MPa



<b>CTP1340</b>
$v_c$ [m/min]
120 – 250
80 – 180
60 – 150
80 – 180
60 – 150
60 – 120
80 – 160
50 – 120
50 – 200
50 – 150
50 – 200
50 – 180
50 – 100
50 – 80
–
–
–
–
–
–
100 – 500
100 – 300
100 – 500
100 – 300
100 – 200
100 – 500
100 – 500
100 – 300
100 – 300
80 – 180
60 – 150
100 – 250
20 – 50
20 – 40
15 – 25
10 – 20
10 – 20
50 – 120
30 – 50
–
–
–
–





# Technical information, spare parts

## Recommended torque moments

Tool	Screw	Torx	Nm	in.lbs
	7897202/M3,5X12,5/T15	T15	3,2	28,3
	7897203/M4,0X14/T15	T15	4,0	35,4
	7897205/M5,0X18/T20	T20	5,0	44,3

## Torque key (inserts/bits)

 1 + 1 + 5 pcs. (incl. in delivery)	Torque moment set to	
	DMSD 3,2Nm/SORT T15	3,2 Nm
	DMSD 4,0Nm/SORT T15	4,0 Nm
	DMSD 5,0Nm/SORT T20	5,0 Nm

 1 + 1 pcs. (incl. in delivery)	Torque moment can be adjusted flexibly	
	DMSD 1–5Nm/SORT	1,0 – 5,0 Nm
	DMSD 2–8Nm/SORT	2,0 – 8,0 Nm

	DMSD-B T15–50mm
	DMSD-B T20–50mm

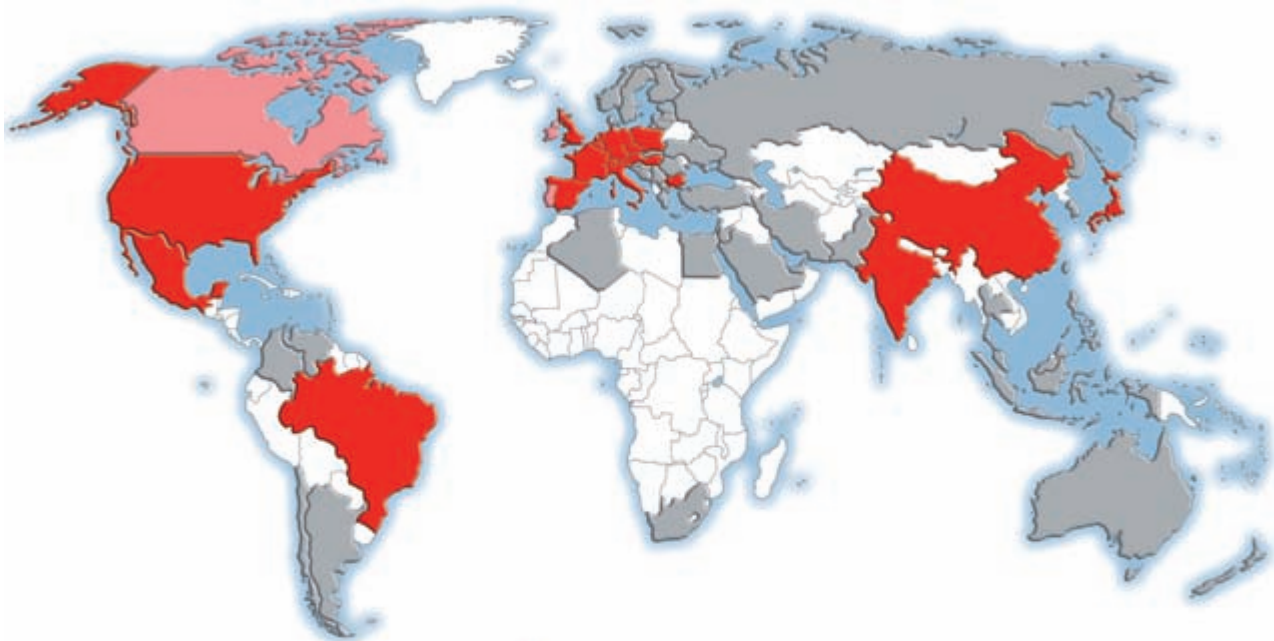
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