WALTER

Product handbook

Parting off

_Walter Cut

Parting off experts



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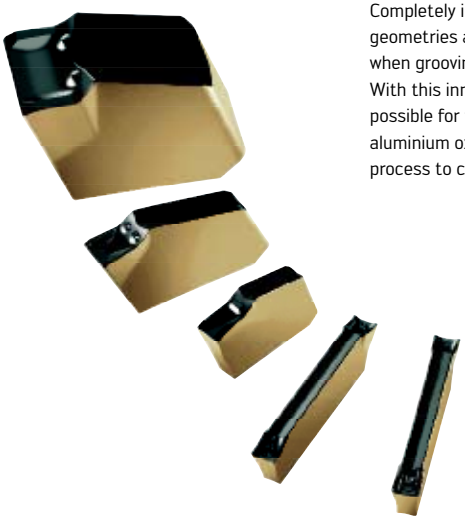
Walter Cut:

Tiger·tec® cutting materials for grooving and parting off



Completely innovative coatings and geometries achieve peak performances when grooving and parting off.
With this innovative development, it is possible for the first time to apply an aluminium oxide coating in a PVD process to carbide indexable inserts.

Tiger·tec®

Tiger·tec® for Walter Cut

This PVD Tiger offers a previously unknown degree of toughness and wear resistance – which is particularly important in parting off.
In addition to this patented PVD **Tiger·tec®** coating and the proven CVD **Tiger·tec®** coating, there is a complete **Tiger·tec®** cutting tool material package available for the Walter Cut parting off system.

THE APPLICATION

- for grooving and parting off
- from unfavourable to stable conditions
- the Walter **Tiger·tec®** cutting materials cover the complete range of grooving

YOUR ADVANTAGES

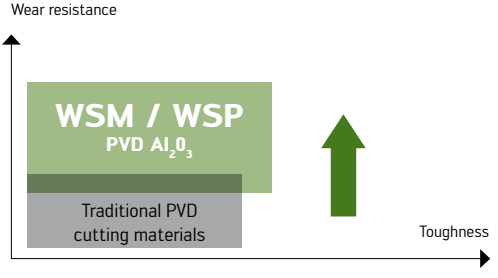
- high productivity due to a reliable machining process
- high temperature resistance in conjunctions with high toughness – especially when parting off to centre
- high cutting edge stability due to low coating temperature and at the same time offering high wear resistance
- smooth surface to reduce built-up cutting edges

THE INSERT GRADES

WSP43 – Tiger·tec® PVD Al_2O_3
- maximum toughness and process reliability for difficult to machine materials, steel and stainless steel
- the cutting material for unfavourable conditions, e.g., heavily interrupted cuts, very unstable clamping, unstable machines and low cutting speeds

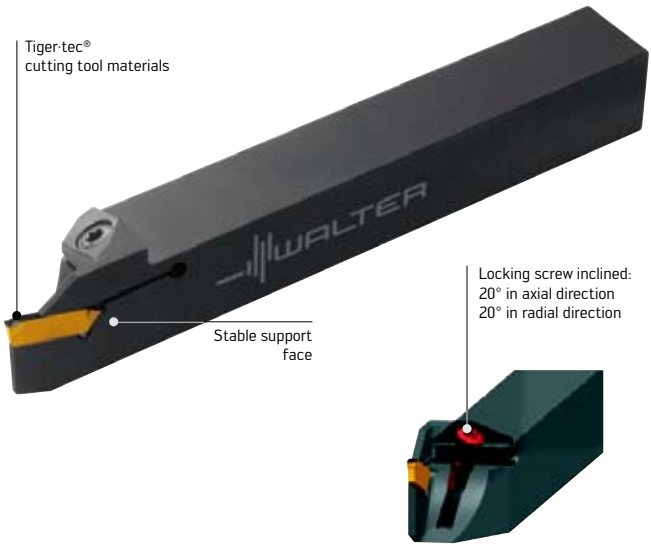
WSM33 – Tiger·tec® PVD Al_2O_3
- maximum resistance to wear and temperature for difficult to machine materials including heat resistant alloys, steel and stainless steel
- the universal cutting material covers the majority of all applications

WPP23 – Tiger·tec® CVD
- maximum hot hardness and wear resistance for steel
- for use in stable conditions in conjunction with high cutting speeds



Walter Cut XLDE

The little guy who packs quite a punch



Walter Cut monoblock toolholder XLDE

THE TOOL

- Walter Cut monoblock tools have been specially designed for parting off
- locking screw with double inclination of 20° in axial and radial directions
- for 2-edge GX16 grooving inserts
- insert widths: 2, 2.5, 3 mm
- shank sizes:
  10 x 10, 12 x 12, 16 x 16, 20 x 20 mm

THE APPLICATION

- parting off of diameters up to 32 mm
- can be used on all types of lathes, in particular
  - automatic lathes
  - Swiss type machines
  - multi-spindle machines
  - lathes with bar feed
- ideally suited for small parts production and the décolletage industry, as well as for general mechanical engineering

THE TOOL STYLES



XLDE L … C



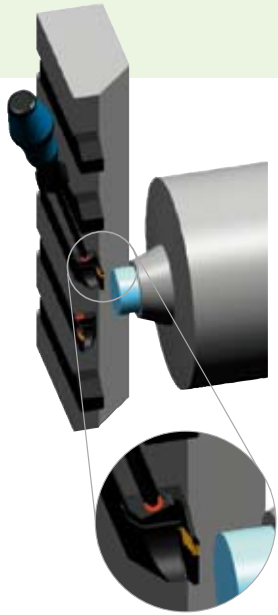
XLDE L



XLDE R



XLDE R … C



Edges can be changed without removing the tool from machines with linear units

Parting off of pistons

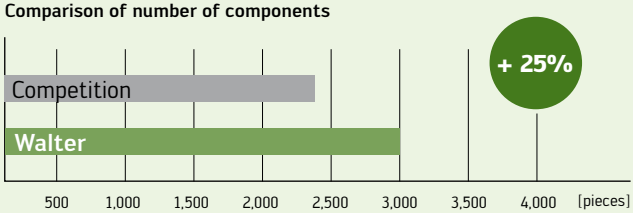
[HS6–5–2 (1.3343), ISO P]

Tool:	XLDE R 1212K–GX16–1
Grooving insert:	GX16-1E200 N020-CF6
Insert grade:	WSP 43
Machine:	Star SB16

CUTTING DATA

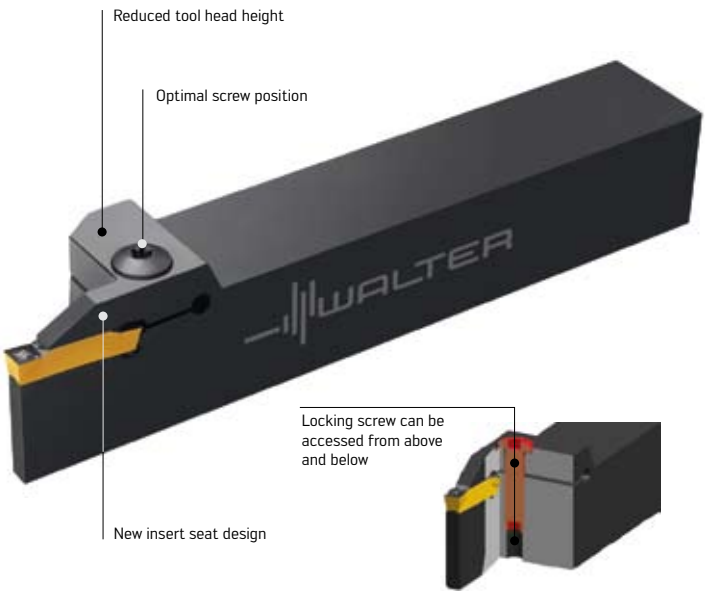
v_c	85 m/min
f	0.06 mm
s	2 mm
T	5 mm

Comparison of number of components



Walter Cut G1011:

One for all



Walter Cut monoblock toolholder G1011:

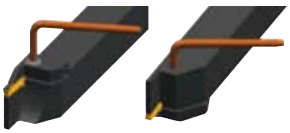
THE TOOL

- Walter Cut monoblock tools for grooving, parting off and turning.
- locking screw can be accessed from above and below
- reduced head height – eases chip evacuation
- for 2-cutting edge GX24 grooving insert
- insert widths 3, 4, 5, 6 mm
- cutting depths 12, 21 mm
- shank sizes 20 x 20, 25 x 25 mm

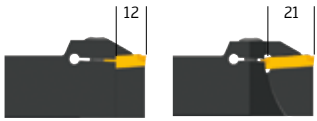
THE APPLICATION

- parting off of diameters up to 42 mm
- grooving and recessing operations up to depth of 21 mm
- for use on lathes of all types
- first choice for all grooving operations

THE BENEFITS TO YOU AT A GLANCE



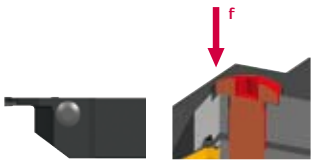
Simple handling in inverted use



Optimum stability due to two insert depths



Simple chip evacuation due to reduced tool head height [h]



Greatest clamping force due to optimum screw position.

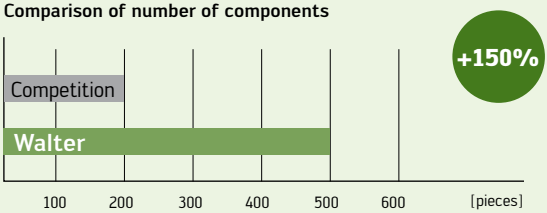
Parting off operation of a guide pin
[60WCrV7 (1.2520), ISO P]

Tool:	G1011.2020R-3T21GX24
Grooving insert:	GX24-2E300 N030-UF4
Insert grade:	WSM 33
Machine:	TAE 30N

CUTTING DATA

v_c	106 m/min
f	0.1 mm
s	3 mm
T	13.5 mm

Comparison of number of components



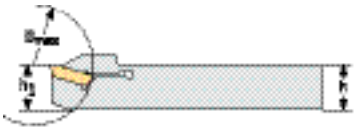
Max. diameter 32 mm

Shank size	1st CHOICE  XLDE / XLDE ... C Page 10		 G 1011 Page 11		 XLCE / XLCF Page 12		 NCAE Page 13	
	s	Tmax	s	Tmax	s	Tmax	s	Tmax
10 x 10	2.0	10			2.2	15		
	2.5	10						
12 x 12	2.0	12			2.2	15	1.95–2.5	7
	2.5	12					3.0–3.5	7
	3.0	12						
16 x 16	2.0	16			2.2	15	1.95–2.5	7
	2.5	16			3.1	15	3.0–3.5	7
	3.0	16						
20 x 20	2.0	16	3.0	12			2.0–2.5	12
	2.5	16	4.0	12			3.0–3.5	12
	3.0	16	5.0	12			4.0–5.0	12
			6.0	12				
25 x 25			3.0	12			2.0–2.5	12
			4.0	12			3.0–3.5	12
			5.0	12			4.0–5.0	12
			6.0	12				
32 x 25							3.0–3.5	12
							4.0–5.0	12
							6.0	12
40 x 37								

s = cutting width / Tmax = max. grooving depth

	Max. diameter 42 mm								Max. diam. 160 mm			
	1st CHOICE								1st CHOICE			
												
	G 1011		**NCBE**		**XLCE / XLCF**		**NCDE**		**XLCEN / XLCFN**		**NCDE**	
	Page 14		Page 15		Page 14		Page 15		Page 16		Page 17	
	s	Tmax	s	Tmax	s	Tmax	s	Tmax	s	Tmax	s	Tmax
	3	21	3	21	3.1	20	2.2	20	2.2	21		
	4	21			4.1	20	3.1	20	3.1	35		
	5	21					4.1	20	4.1	40		
	6	21										
	3	21	3	21					2.2	30		
	4	21	4	21					3.1	50	3.1	25/35
	5	21	5	21					4.1	50	4.1	25/35
	6	21	6	21					5.1	55	5.1	25/35
			8	21					6.5	55	6.5	25/35
			4	21					2.2	30		
			5	21					3.1	50	3.1	32/45
			6	21					4.1	50	4.1	32/45
									5.1	55	5.1	32/45
									6.5	55	6.5	32/45
									8.2	80		
									8.2	80		
									9.7	80		

XLDE / XLDE ... C





s mm	D_{max} mm	$h = h_1$ mm	b mm	Designation	Type
2.0–2.5	20	10	10	XLDE R/L 1010 K–GX16–1	GX 16–1E2 . .
	24	12	12	XLDE R/L 1212 K–GX16–1	
	32	16	16	XLDE R/L 1616 K–GX16–1	
	32	20	20	XLDE R/L 2020 K–GX16–1	
3.0	24	12	12	XLDE R/L 1212 K–GX16–2	GX 16–2E3 . .
	32	16	16	XLDE R/L 1616 K–GX16–2	
	32	20	20	XLDE R/L 2020 K–GX16–2	
2.0–2.5	20	10	10	XLDE R/L 1010 K–GX16–1C	GX 16–1E2 . .
	24	12	12	XLDE R/L 1212 K–GX16–1C	
	32	16	16	XLDE R/L 1616 K–GX16–1C	
3.0	24	12	12	XLDE R/L 1212 K–GX16–2C	GX 16–2E3 . .
	32	16	16	XLDE R/L 1616 K–GX16–2C	

For inserts see page 19.

Tool styles
Normal version and contra version (... C)


XLDE R


XLDE R ... C


XLDE L ... C


XLDE L

G1011

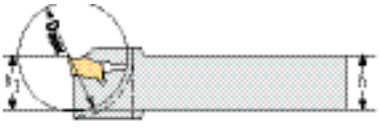




s mm	T_{max} mm	$h = h_1$ mm	b mm	Designation	Type
3	12	20	20	G1011.2020 R/L–3T12 GX24	GX 24–2E3 . .
	12	25	25	G1011.2525 R/L–3T12 GX24	
4	12	20	20	G1011.2020 R/L–4T12 GX24	GX 24–3E4 . .
	12	25	25	G1011.2525 R/L–4T12 GX24	
5	12	20	20	G1011.2020 R/L–5T12 GX24	GX 24–3E5 . .
	12	25	25	G1011.2525 R/L–5T12 GX24	
6	12	20	20	G1011.2020 R/L–6T12 GX24	GX 24–4E6 . .
	12	25	25	G1011.2525 R/L–6T12 GX24	

For inserts see page 19.

XLCE / XLCF



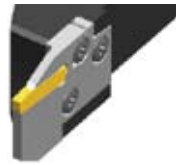


s mm	D_{max} mm	$h = h_1$ mm	b mm	Designation	Type
2.2	30	10	10	XLCE R/L 1010 M22–FX	FX 2.2 . . .
	30	12	12	XLCE R/L 1212 F22–FX	
	30	12	12	XLCE R/L 1212 M22–FX	
	30	14	14	XLCE R/L 1414 M22–FX	
	30	16	12	XLCE R/L 1612 H22–FX	
3.1	30	16	12	XLCF R/L 1612 H31–FX	FX 3.1 . . .

For inserts see page 24.

NCAE





s mm	T_{max} mm	$h = h_1$ mm	b mm	Designation	Type
1.95–2.5	7	12	12	NCAE 12–1212 R/L–GX 09–1	GX 09–1 …
	7	16	16	NCAE 16–1616 R/L–GX 09–1	
3.0–3.5	7	12	12	NCAE 12–1212 R/L–GX 09–2	GX 09–2 …
	7	16	16	NCAE 16–1616 R/L–GX 09–2	
2.0–2.5	12	20	20	NCAE 20–2020 R/L–GX 16–1	GX 16–1 …
	12	25	25	NCAE 25–2525 R/L–GX 16–1	
3.0–3.5	12	20	20	NCAE 20–2020 R/L–GX 16–2	GX 16–2 …
	12	25	25	NCAE 25–2525 R/L–GX 16–2	
	12	32	25	NCAE 32–3225 R/L–GX 16–2	
4.0–5.0	12	20	20	NCAE 20–2020 R/L–GX 16–3	GX 16–3 …
	12	25	25	NCAE 25–2525 R/L–GX 16–3	
	12	32	25	NCAE 32–3225 R/L–GX 16–3	
6.0	12	25	25	NCAE 25–2525 R/L–GX 16–4	GX 16–4 …
	12	32	25	NCAE 32–3225 R/L–GX 16–4	

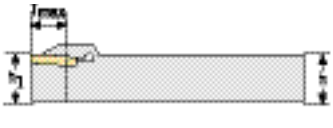
For inserts see page 19.

These tools are also available in the Walter Capto version.
See the Walter general catalogue.

Walter Cut

Tools for parting off up to 42 mm

G1011

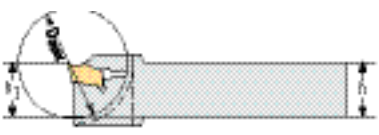


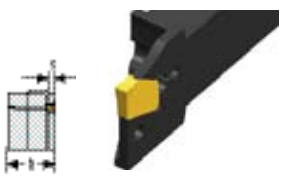


s mm	T_{max} mm	$h = h_1$ mm	b mm	Designation	Type
3	21	20	20	G1011.2020 R/L–3T21 GX24	GX 24–2E3 . .
	21	25	25	G1011.2525 R/L–3T21 GX24	
4	21	20	20	G1011.2020 R/L–4T21 GX24	GX 24–3E4 . .
	21	25	25	G1011.2525 R/L–4T21 GX24	
5	21	20	20	G1011.2020 R/L–5T21 GX24	GX 24–3E5 . .
	21	25	25	G1011.2525 R/L–5T21 GX24	
6	21	20	20	G1011.2020 R/L–6T21 GX24	GX 24–4E6 . .
	21	25	25	G1011.2525 R/L–6T21 GX24	

For inserts see page 19.

XLCE / XLCF





s mm	D_{max} mm	$h = h_1$ mm	b mm	Designation	Type
3.1	40	20	16	XLCE R/L 2016 K31–FX	FX 3.1 . . .
4.1	40	20	16	XLCF R/L 2016 K41–FX	FX 4.1 . . .

For inserts see page 24.

NCBE

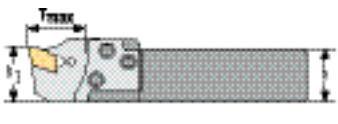




s mm	T_{max} mm	$h = h_1$ mm	b mm	Designation	Type
3.0–3.5	21	20	20	NCBE 20–2020 R/L–GX 24–2–21	GX 24–2 …
	21	25	25	NCBE 25–2525 R/L–GX 24–2–21	
4.0–5.0	21	25	25	NCBE 25–2525 R/L–GX 24–3–21	GX 24–3 …
	21	32	25	NCBE 32–3225 R/L–GX 24–3–21	
6.0	21	25	25	NCBE 25–2525 R/L–GX 24–4–21	GX 24–4 …
	21	32	25	NCBE 32–3225 R/L–GX 24–4–21	
8.0	21	25	25	NCBE 25–2525 R/L–GX 24–5–21	GX 24–5 …

For inserts see page 19.

NCDE





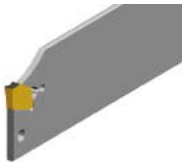
s mm	T_{max} mm	$h = h_1$ mm	b mm	Designation	Type
2.2	20	20	20	NCDE 20–2020 R/L–FX 22–20	FX 2.2 …
	20	25	25	NCDE 25–2525 R/L–FX 22–20	
3.1	20	20	20	NCDE 20–2020 R/L–FX 31–20	FX 3.1 …
4.1	20	20	20	NCDE 20–2020 R/L–FX 41–20	FX 4.1 …

For inserts see page 24.

These tools are also available in the Walter Capto version.
See the Walter general catalogue.

XLCEN / XLCFN

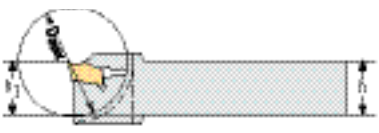




s mm	T_{max} mm	$h_3 = h_4$ mm	b mm	Designation	Type
2.2	25	26		XLCEN 2602 J22–FX	FX 2.2 . . .
	30	32		XLCEN 3202 M22–FX	
3.1	35	26		XLCFN 2603 J31–FX	FX 3.1 . . .
	50	32		XLCFN 3203 M31–FX	
4.1	40	26		XLCFN 2604 J41–FX	FX 4.1 . . .
	50	32		XLCFN 3204 M41–FX	
5.1	55	32		XLCFN 3205 M51–FX	FX 5.1 . . .
6.5	55	32		XLCFN 3206 M65–FX	FX 6.5 . . .
8.2	80	46		XLCEN 4608 S82–FX	FX 8.2 . . .
9.7	80	46		XLCFN 4609 S97–FX	FX 9.7 . . .

For inserts see page 24.

XCLE / XCLF

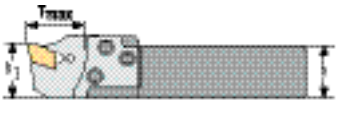




s mm	D_{max} mm	$h = h_1$ mm	b mm	Designation	Type
3.1	40	20	16	XLCE R/L 2016 K31–FX	FX 3.1 . . .
4.1	40	20	16	XLCF R/L 2016 K41–FX	FX 4.1 . . .

For inserts see page 24.

NCDE





s mm	T_{max} mm	$h = h_1$ mm	b mm	Designation	Type
3.1	25	25	25	NCDE 25–2525 R/L–FX 31–25	FX 3.1 …
	32	32	25	NCDE 32–3225 R/L–FX 31–32	
	35	25	25	NCDE 25–2525 R/L–FX 31–35	
	45	32	25	NCDE 32–3225 R/L–FX 31–45	
4.1	25	25	25	NCDE 25–2525 R/L–FX 41–25	FX 4.1 …
	32	32	25	NCDE 32–3225 R/L–FX 41–32	
	35	25	25	NCDE 25–2525 R/L–FX 41–35	
	45	32	25	NCDE 32–3225 R/L–FX 41–45	
5.1	25	25	25	NCDE 25–2525 R/L–FX 51–25	FX 5.1 …
	32	32	25	NCDE 32–3225 R/L–FX 51–32	
	35	25	25	NCDE 25–2525 R/L–FX 51–35	
	45	32	25	NCDE 32–3225 R/L–FX 51–45	
6.5	25	25	25	NCDE 25–2525 R/L–FX 65–25	FX 6.5 …
	32	32	25	NCDE 32–3225 R/L–FX 65–32	
	35	25	25	NCDE 25–2525 R/L–FX 65–35	
	45	32	25	NCDE 32–3225 R/L–FX 65–45	

For inserts see page 24.

These tools are also available as the Walter Capto version.
See the Walter general catalogue.



The new generation of Walter Cut tools.
Because compromise is not an option when it comes to grooving.

Expect more.
Engineer what you envision.
Experience the new Walter.

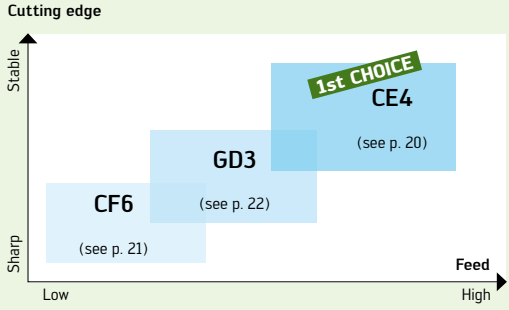
WALTER



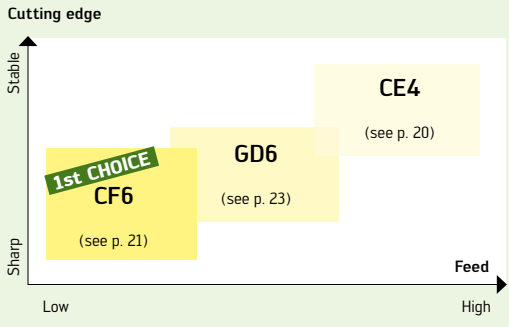
GX inserts for parting off

Geometry selection

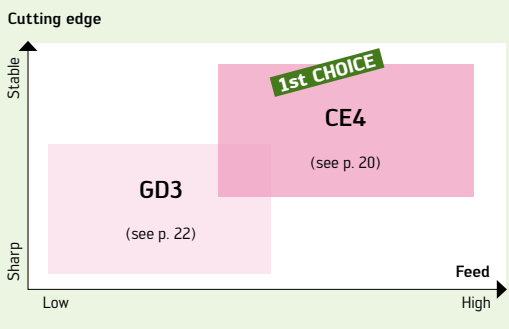
ISO P
Steel



ISO M
Stainless steel



ISO K
Cast iron

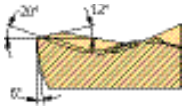


CE4 – the universal insert



THE RIGHT CUTTING EDGE FOR

- grooving and parting off operations
- moderate to high feeds
- good chip formation



Cutting edge design

WALTER SELECT

Optimum indexable insert for:

good moderate poor

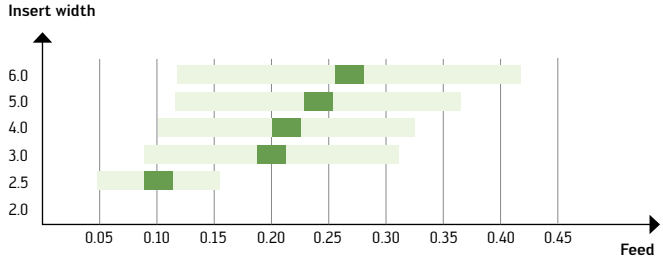
machining conditions

GX–CE4

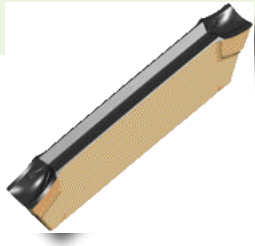


Designation	l mm	s mm	r mm	χ	coated grades P WPP 23	P WSM 33	P WSP 43	M WSM 33	M WSP 43	K WPP 23	S WSM 33	S WSP 43
GX16–1E250 N020–CE4	16.6	2.5	0.2	—		+	○	+	○		+	○
GX16–2E300 N020–CE4	16.6	3.0	0.2	—		+	○	+	○		+	○
GX24–2E300 N020–CE4	24	3.0	0.2	—	+	+	○	+	○	+	+	○
GX24–3E400 N030–CE4	24	4.0	0.3	—	+	+	○	+	○	+	+	○
GX24–3E500 N030–CE4	24	5.0	0.3	—	+	+	○	+	○	+	+	○
GX24–4E600 N030–CE4	24	6.0	0.3	—	+	+	○	+	○	+	+	○
GX16–1E250 R6–CE4	16.6	2.5	0.2	6°		+	○	+	○		+	○
GX16–2E300 R6–CE4	16.6	3.0	0.2	6°		+	○	+	○		+	○
GX16–1E250 L6–CE4	16.6	2.5	0.2	6°		+	○	+	○		+	○
GX16–2E300 L6–CE4	16.6	3.0	0.2	6°		+	○	+	○		+	○

For cutting speed recommendations see page 30.

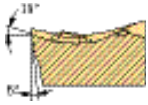


CF6 – the sharp insert



THE RIGHT CUTTING EDGE FOR

- low feeds
- stainless steels
- minimal burr/pip at centre
- low cutting force



Cutting edge design

WALTER SELECT

Optimum indexable insert for:

good moderate poor

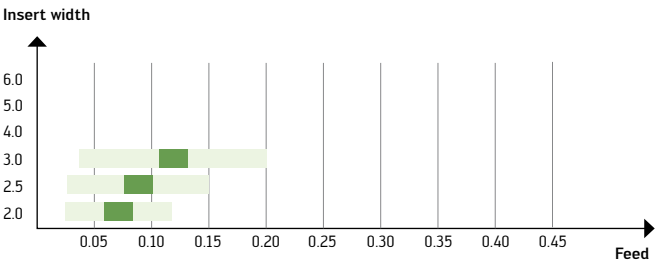
machining conditions

GX–CF6



Designation	l mm	s mm	r mm	χ	coated grades P WPP 23	P WSM 33	P WSP 43	M WSM 33	M WSP 43	K WPP 23	S WSM 33	S WSP 43
GX16–1E200 N020–CF6	16.6	2.0	0.2	—		☺	☹	☺	☹		☹	☹
GX16–1E250 N020–CF6	16.6	2.5	0.2	—		☺	☹	☺	☹		☹	☹
GX16–2E300 N020–CF6	16.6	3.0	0.2	—		☺	☹	☺	☹		☹	☹
GX16–1E200 R6–CF6	16.6	2.0	0.2	6°		☺	☹	☺	☹		☹	☹
GX16–1E250 R6–CF6	16.6	2.5	0.2	6°		☺	☹	☺	☹		☹	☹
GX16–2E300 R6–CF6	16.6	3.0	0.2	6°		☺	☹	☺	☹		☹	☹
GX16–1E200 L6–CF6	16.6	2.0	0.2	6°		☺	☹	☺	☹		☹	☹
GX16–1E250 L6–CF6	16.6	2.5	0.2	6°		☺	☹	☺	☹		☹	☹
GX16–2E300 L6–CF6	16.6	3.0	0.2	6°		☺	☹	☺	☹		☹	☹

For cutting speed recommendations see page 30.

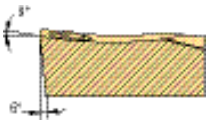


GD3 – the soft cutting insert



THE RIGHT CUTTING EDGE FOR

- very soft cutting action
- light to moderate feeds
- general parting off and grooving operations



Cutting edge design

WALTER SELECT

Optimum indexable insert for:

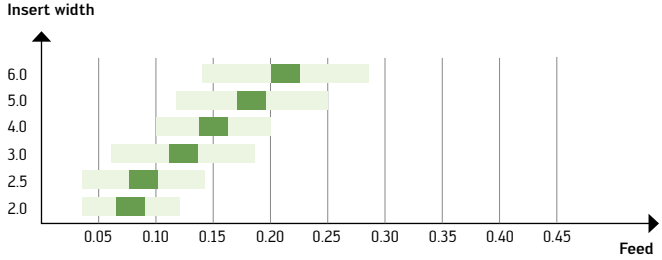
good moderate poor

machining conditions

GX–GD3

Designation	l mm	s mm	r mm	coated grades P WPP 23	P WSM 33	P WSP 43	M WSM 33	M WSP 43	K WPP 23	S WSM 33	S WSP 43
GX16–1E200 N020–GD3	16	2.0	0.2	☺	😐	☹	☺	☹	😐	😐	☹
GX16–1E250 N020–GD3	16	2.5	0.2	☺	😐	☹	☺	☹	😐	😐	☹
GX16–2E300 N030–GD3	16	3.0	0.3	☺	😐	☹	☺	☹	😐	😐	☹
GX16–3E400 N040–GD3	16	4.0	0.4	☺	😐	☹	☺	☹	😐	😐	☹
GX16–3E500 N040–GD3	16	5.0	0.4	☺	😐	☹	☺	☹	😐	😐	☹
GX16–4E600 N050–GD3	16	6.0	0.5	☺	😐	☹	☺	☹	😐	😐	☹
GX24–2E300 N030–GD3	24	3.0	0.3	☺	😐	☹	☺	☹	😐	😐	☹
GX24–3E400 N040–GD3	24	4.0	0.4	☺	😐	☹	☺	☹	😐	😐	☹
GX24–3E500 N040–GD3	24	5.0	0.4	☺	😐	☹	☺	☹	😐	😐	☹
GX24–4E600 N050–GD3	24	6.0	0.5	☺	😐	☹	☺	☹	😐	😐	☹

For cutting speed recommendations see page 30.

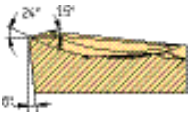


GD6 – the reliable insert



THE RIGHT CUTTING EDGE FOR

- medium feed rates
- long-chipping materials
- medium machining conditions



Cutting edge design

WALTER SELECT

Optimum indexable insert for:

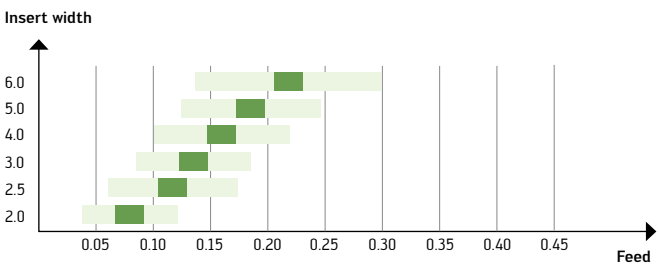
good moderate poor

machining conditions

GX–GD6

Designation	l mm	s mm	r mm	coated grades P WXM 33	P	P	M WAM 20	M WXM 33	K	S WAM 20	S
GX16–1E200 N020–GD6	16	2.0	0.2	☹			☺	😐		☺	
GX16–1E250 N020–GD6	16	2.5	0.2	☹			☺	😐		☺	
GX16–2E300 N030–GD6	16	3.0	0.3	☹			☺	😐		☺	
GX16–3E400 N040–GD6	16	4.0	0.4	☹			☺	😐		☺	
GX16–3E500 N040–GD6	16	5.0	0.4	☹			☺	😐		☺	
GX16–4E600 N050–GD6	16	6.0	0.5	☹			☺	😐		☺	
GX24–2E300 N030–GD6	24	3.0	0.3	☹			☺	😐		☺	
GX24–3E400 N040–GD6	24	4.0	0.4	☹			☺	😐		☺	
GX24–3E500 N040–GD6	24	5.0	0.4	☹			☺	😐		☺	
GX24–4E600 N050–GD6	24	6.0	0.5	☹			☺	😐		☺	

For cutting speed recommendations see page 30.

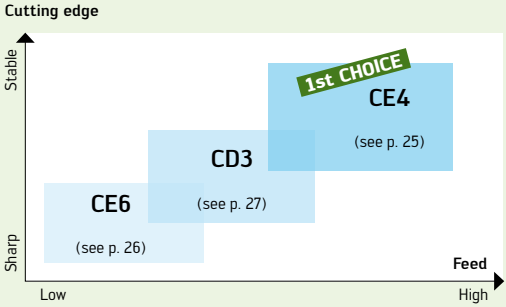




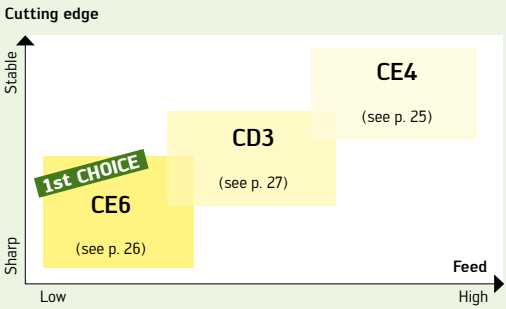
FX inserts for parting off

Geometry selection

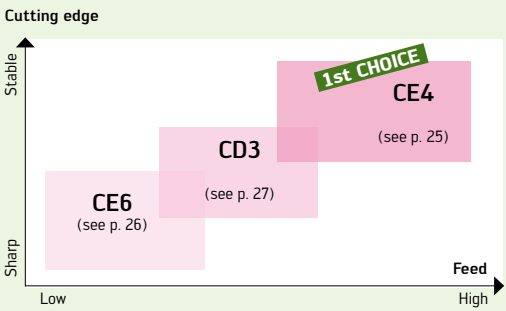
ISO P
steel



ISO M
Stainless steel



ISO K
Cast iron

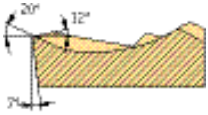


FX-CE4 – the universal insert



THE RIGHT CUTTING EDGE FOR

- grooving and parting off operations
- moderate to high feeds
- good chip formation



Cutting edge design

WALTER SELECT

Optimum indexable insert for:

good | moderate | poor

machining conditions

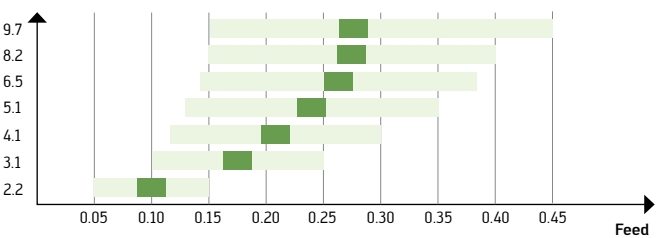
FX–CE4



Designation	s mm	r mm	χ	coated grades P WPP 23	P WSM 33	P WSP 43	M WSM 33	M WSP 43	K WPP 23	S WSM 33	S WSP 43
FX2.2-E220N010-CE4	2.2	0.1	0°	☺	😐	☹	☺	☹	😐	😐	☹
FX3.1-E310N015-CE4	3.1	0.15	0°	☺	😐	☹	☺	☹	😐	😐	☹
FX4.1-E410N020-CE4	4.1	0.2	0°	☺	😐	☹	☺	☹	😐	😐	☹
FX5.1-E510N025-CE4	5.1	0.25	0°	☺	😐	☹	☺	☹	😐	😐	☹
FX6.5-E650N030-CE4	6.5	0.3	0°	☺	😐	☹	☺	☹	😐	😐	☹
FX8.2-E820N040-CE4	8.2	0.4	0°	☺	😐	☹	☺	☹	😐	😐	☹
FX9.7-E970N040-CE4	9.7	0.4	0°	☺	😐	☹	☺	☹	😐	😐	☹
FX2.2-E220R/L4-CE4*	2.2	0.1	4°	☺	😐	☹	☺	☹	😐	😐	☹
FX3.1-E310R/L6-CE4*	3.1	0.15	6°	☺	😐	☹	☺	☹	😐	😐	☹
FX4.1-E410R/L6-CE4*	4.1	0.2	6°	☺	😐	☹	☺	☹	😐	😐	☹

* for R/L version, see page 34.
For cutting speed recommendations see page 30.

Insert width

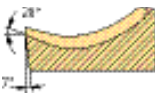


FX-CE6 – the free cutting insert



THE RIGHT CUTTING EDGE FOR

- light to moderate feeds
- long-chipping materials
- minimal pip left at centre



Cutting edge design

WALTER SELECT

Optimum indexable insert for:

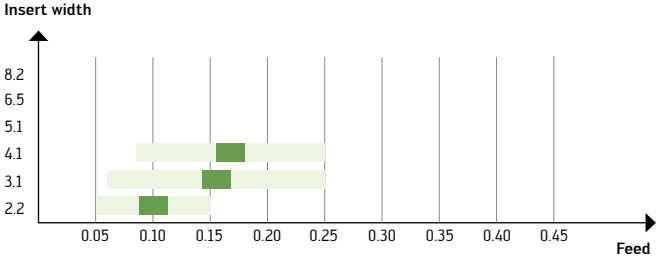
good moderate poor

machining conditions

FX–CE6

Designation	s mm	r mm	χ	coated grades P WPP 23	P WSM 33	P WSP 43	M WSM 33	M WSP 43	K WPP 23	S WSM 33	S WSP 43
FX2.2-E220N015-CE6	2.2	0.15	0°	☺	😐	☹	☺	☹	😐	😐	☹
FX3.1-E310N020-CE6	3.1	0.2	0°	☺	😐	☹	☺	☹	😐	😐	☹
FX3.1-E310N040-CE6	3.1	0.4	0°	☺	😐	☹	☺	☹	😐	😐	☹
FX4.1-E410N020-CE6	4.1	0.2	0°	☺	😐	☹	☺	☹	😐	😐	☹
FX4.1-E410N050-CE6	4.1	0.5	0°	☺	😐	☹	☺	☹	😐	😐	☹
FX2.2-E220R/L5-CE6*	2.2	0.15	5°	☺	😐	☹	☺	☹	😐	😐	☹
FX3.1-E310R/L5-CE6*	3.1	0.2	5°	☺	😐	☹	☺	☹	😐	😐	☹
FX4.1-E410R/L5-CE6*	4.1	0.2	5°	☺	😐	☹	☺	☹	😐	😐	☹

* for R/L version, see page 34.
For cutting speed recommendations see page 30.

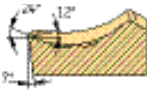


FX-CD3 – the stable insert



THE RIGHT CUTTING EDGE FOR

- unfavourable machining conditions
- medium feed area
- machining steel



Cutting edge design

WALTER SELECT

Optimum indexable insert for:

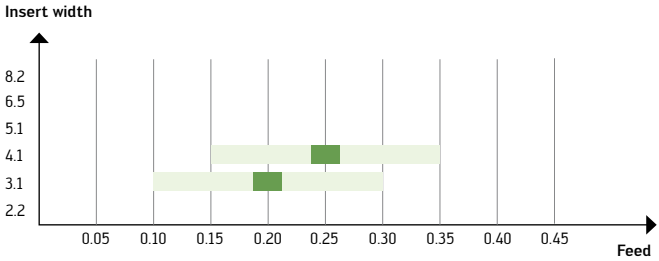
good moderate poor

machining conditions

FX–CD3

Designation	s mm	r mm	χ	coated grades P WPP 23	P WSM 33	P WSP 43	M WSM 33	M WSP 43	K WPP 23	S WSM 33	S WSP 43
FX3.1-E310N040-CD3	3.1	0.4	0°	☺		☹		☹	☹		☹
FX4.1-E410N020-CD3	4.1	0.2	0°	☺		☹		☹	☹		☹
FX4.1-E410N050-CD3	4.1	0.5	0°	☺		☹		☹	☹		☹

For cutting speed recommendations see page 30.



Grade application chart

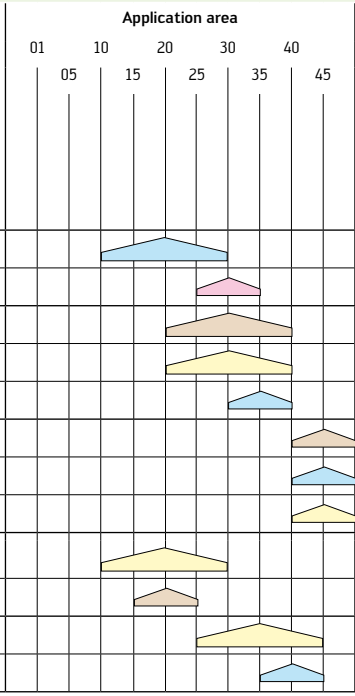
Insert grades for parting off

Walter grade designation	Standard designation	Workpiece material group						
		P steel	M Stainless steel	K Cast iron	N Non-ferrous metals	S Heat resistant alloys	H Hard materials	
WPP 23	HC – P 20	●●						
	HC – K 30			●				
	HC – S 30					●●		
WSM 33	HC – M 30		●●					
	HC – P 35	●●						
	HC – S 45					●●		
WSP 43	HC – P 45	●●						
	HC – M 45		●●					
WAM 20	HC – M 20		●●					
	HC – S 20					●		
WXM 33	HC – M 35		●●					
	HC – P 40	●						

HC = Coated carbide

●● Primary application

● Additional application



Coating process	Coating composition
CVD	TiCN + Al_2O_3 (+TiN)
PVD	TiAlN + Al_2O_3 (ZrCN)
PVD	TiAlN + Al_2O_3 (ZrCN)
CVD	TiCN + Al_2O_3 + HfN
PVD	Multilayer TiAlN / TiN +ZrCN

Cutting data for Walter Cut – parting off

coated carbide grades

Material group	Workpiece material			Brinell hardness HB	Machining group[4]	
Classification of the main material groups and code letters						
P	Unalloyed steel[1]	Approx. 0.15% C	annealed	125	1	
		Approx. 0.45% C	annealed	190	2	
		Approx. 0.45% C	tempered	250	3	
		Approx. 0.75% C	annealed	270	4	
		Approx. 0.75% C	tempered	300	5	
	Low-alloyed steel[1]	annealed		180	6	
		tempered		275	7	
		tempered		300	8	
		tempered		350	9	
	High-alloyed steel and high-alloyed tool steel[1]	annealed		200	10	
		hardened by tempering		325	11	
	Stainless steel[1]	annealed ferritic/martensitic		200	12	
		martensitic, tempered		240	13	
M	Stainless steel[1]	austenitic[2], quench hardened		180	14	
K	Grey cast iron	pearlitic/ferritic		180	15	
		pearlitic (martensitic)		260	16	
	Cast iron with spheroidal graphite	ferritic		160	17	
		pearlitic		250	18	
	Malleable cast iron	ferritic		130	19	
		pearlitic		230	20	
S	Heat resistant alloys	Fe based	annealed	200	31	
			hardened	280	32	
		Ni or Co based	annealed	250	33	
			hardened	350	34	
			cast	320	35	
	Titanium alloys	Alpha + Beta alloys, hardened		1050[3]	37	

[1] and cast steel

[2] and austenitic / ferritic

[3] Rm: tensile strength in MPa = N/mm2

[4] The machining group categories can be found in the Walter general catalogue.

	Cutting speed v_c [m/min]				
	WPP 23	**WSM 33**	**WSP 43**	**WAM 20**	**WXM 33**
	180				180
	180	130	120		150
	160	130	120		130
	120	120	110		100
	110	120	110		80
	140	130	120		140
	120	120	110		120
	120	100	90		110
	110	90	80		80
	120	90	80		90
	90	80	80		
	160	150	160	160	160
	100	80	80	90	70
		130	120	150	120
	200				
	160				
	180				
	140				
	180				
	150				
		50	50		
		40	40		
		30	30		
		30	30		
		20	20		
		40	30		

User Guide – parting off

Tool selection

General

It is essential to note that the most rigid tool possible should be selected. This can reduce vibrations and increase the tool edge life.

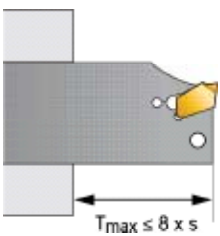
Insert width

The insert width should be as narrow as possible, but as wide as necessary. By reducing the insert width, the cutting force is reduced and material is saved.



Insert depth

The max. insert depth [Tmax] of the tool or the max. overhang length of the insert holder should not exceed 8 x edge width s.
The tool selected should always have the minimal amount of overhang possible.



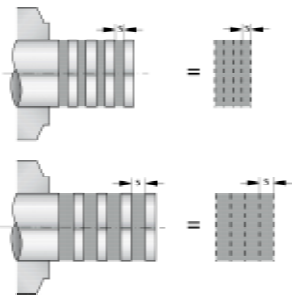
1. Use a neutral edge where possible

- improved chip formation
- lower axial forces
- longer insert edge life



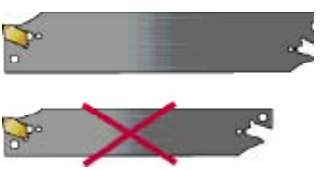
2. Use the smallest insert width possible

- lower cutting force
- reduced material consumption



3. Use the largest tool possible (in relation to the height of the body)

- greater tool rigidity
- reduced risk of vibrations
- longer insert edge life



User Guide – parting off

Effect of the approach angle on machining

The edge is viewed from above, not from the front as with tools, in order to determine the layout of the cutting edge (right/left).

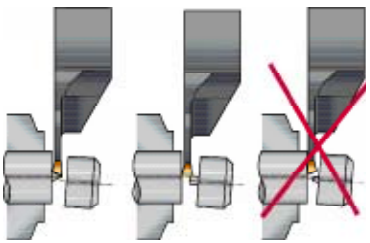
The following rule must always be applied:

Direction of rotation of the machine spindle:

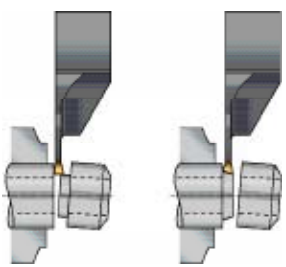
right → right cutting edge
left → left cutting edge



When solid material is parted off, the use of cutting edges with lead angles reduces the small 'pip' of the component that has been parted off.

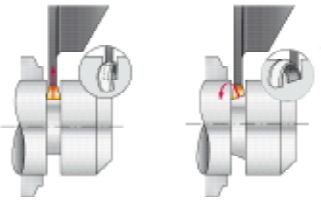


When hollow material is parted off, the use of inclined cutting edges prevents rings from forming, which could, in some circumstances, get caught on the part that has been parted off and interfere with the rest of the production process. It also leads to lower burr formation.



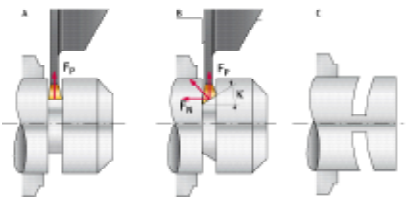
The use of inclined cutting edges always has a negative effect on the insert edge life of the cutting edge. If possible, neutral cutting edges should be used.

When angled cutting edges are used for parting off, the approach angle is likely to cause poorer chip forming. The chip revolves at 90° to the main cutting edge, thereby not taking on a mainspring shape (as with a neutral cutting edge), but instead that of a spiral coil.

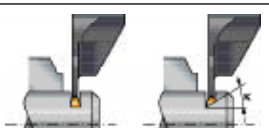


One possibility for guiding the chip is to interrupt cutting briefly once an insert depth of 1–2 x s is reached. Once cutting resumes, the chip will move in the existing groove.

The feed values must be reduced by approximately 30%, because the tool is affected by the resultant axial force (Fn), which can lead to vibration and convex machined surfaces.



Effects on machining

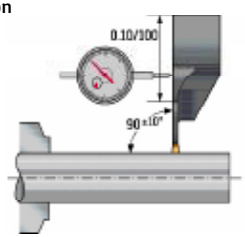


Stability and insert edge life	good	poor
Radial cutting forces (positive)	high	low
Axial cutting forces (negative)	low	high
Remaining pip / burr formation	large	small
Risk of vibration	low	high
Surface finish and flatness	good	poor
Chip flow	good	poor

Tool set-up

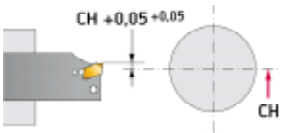
1. Tool must be aligned 90° to the axis of rotation

- better machined face flatness
- reduced risk of vibration



2. Check centre height

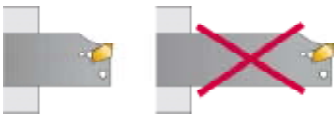
- better insert edge life
- reduced pip/burr formation



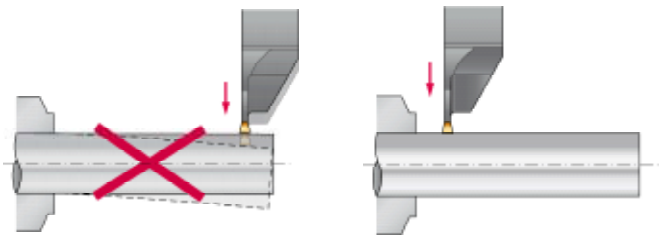
If the tool is positioned over or under centre, the effective edge angle changes during machining.

3. Se the tool in the machine as short as possible

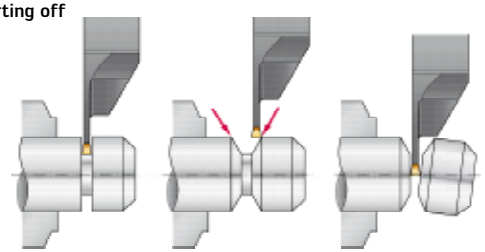
- better machined face flatness
- reduced risk of vibration
- better insert edge life



Clamp the workpiece as short as possible



Chamfering and parting off



1. Pre-groove 2. Chamfer 3. Part off

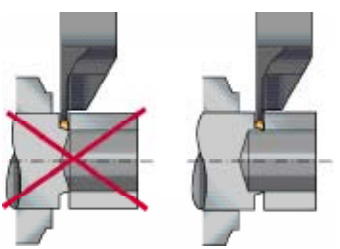
Chamfering the interior before parting off

The corner cutting edge of the chamfering tool and parting off tool must be precisely aligned to achieve as burr-free a result as possible.



Parting off to a bore

The hole must be pre-bored deeply enough that the entire edge width of the parting off tool leaves the cylindrical section of the hole.



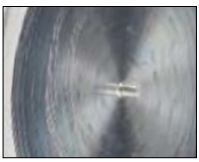
Fault analysis



Large residual pip / burr
- → reduce the feed value by 50–70% from the diameter 1.5 x s (s = edge width)
- → use a cutting edge with lead angle
- → use a narrower insert (reduce the cutting force)
- → use a smaller corner radius
- → use more positive geometry
- → check the centre height



Poor surface / vibrations
- → use a more rigid tool
- → clamp the tool with a shorter overhang
- → check whether the insert seat is damaged
- → increase the cutting speed
- → use a more positive geometry
- → increase the feed



Damage due to swarf
- → use a geometry with greater chip forming
- → lower the cutting speed
- → use neutral cutting edges
- → optimise coolant



Poor chip formation
- → lower the cutting speed
- → improve coolant
- → check the insert geometry

Poor face flatness
- → use a cutting edge without, or with a small, lead angle
- → use a tool with the shortest possible cutting depth for the application
- → reduce the feed for inserts with a lead angle
- → use a smaller corner radius
- → use a more positive geometry
- → align the tool correctly

Wear analysis



Flank face wear
- → use a more wear-resistant grade
- → reduce the cutting speed
- → improve coolant conditions



Plastic deformation
- → use a more wear-resistant grade
- → reduce feed
- → optimise coolant
- → reduce the cutting speed



Chipping
- → use tougher grades of carbide
- → use a more rigid tool
- → use stronger geometries
- → use a wider insert if necessary
- → check the centre height



Built-up cutting edge
- → increase the cutting speed
- → use a more positive geometry
- → optimise coolant

Hardness comparison table

Tensile strength, Brinell, Vickers and Rockwell hardness (extract from DIN 50150)

Tensile strength [N/mm²]	Vickers hardness	Brinell hardness	Rockwell hardness
Rm	HV	HB	HRC
255	80	76.0	
270	85	80.7	
285	90	85.5	
305	95	90.2	
320	100	95.0	
335	105	99.8	
350	110	105	
370	115	109	
385	120	114	
400	125	119	
415	130	124	
430	135	128	
450	140	133	
465	145	138	
480	150	143	
495	155	147	
510	160	152	
530	165	156	
545	170	162	
560	175	166	
575	180	171	
595	185	176	
610	190	181	
625	195	185	
640	200	190	
660	205	195	
675	210	199	
690	215	204	
705	220	209	
720	225	214	
740	230	219	
755	235	223	
770	240	228	20.3
785	245	233	21.3
800	250	238	22.2
820	255	242	23.1
835	260	247	24.0
850	265	252	24.8
865	270	257	25.6
880	275	261	26.4

Tensile strength [N/mm²]	Vickers hardness	Brinell hardness	Rockwell hardness
Rm	HV	HB	HRC
900	280	266	27.1
915	285	271	27.8
930	290	276	28.5
950	295	280	29.2
965	300	285	29.8
995	310	295	31.0
1,030	320	304	32.2
1,060	330	314	33.3
1,095	340	323	34.4
1,125	350	333	35.5
1,155	360	342	36.6
1,190	370	352	37.7
1,220	380	361	38.8
1,255	390	371	39.8
1,290	400	380	40.8
1,320	410	390	41.8
1,350	420	399	42.7
1,385	430	409	43.6
1,420	440	418	44.5
1,455	450	428	45.3
1,485	460	437	46.1
1,520	470	447	46.9
1,555	480	(456)	47.7
1,595	490	(466)	48.4
1,630	500	(475)	49.1
1,665	510	(485)	49.8
1,700	520	(494)	50.5
1,740	530	(504)	51.1
1,775	540	(513)	51.7
1,810	550	(523)	52.3
1,845	560	(532)	53.0
1,880	570	(542)	53.6
1,920	580	(551)	54.1
1,955	590	(561)	54.7
1,995	600	(570)	55.2

Tensile strength [N/mm²]	Vickers hardness	Brinell hardness	Rockwell hardness
Rm	HV	HB	HRC
2,030	610	(580)	55.7
2,070	620	(589)	56.3
2,105	630	(599)	56.8
2,145	640	(608)	57.3
2,180	650	(618)	57.8
	660		58.3
	670		58.8
	680		59.2
	690		59.7
	700		60.1
	720		61.0
	740		61.8
	760		62.5
	780		63.3
	800		64.0
	820		64.7
	840		65.3
	860		65.9
	880		66.4
	900		67.0
	920		67.5
	940		68.0

The hardness values converted i.a.w. these tables are approximate only. See DIN 50150.

Speed

$$n = \frac{v_c \cdot 1000}{D_c \cdot \pi} \quad [\text{min}^{-1}]$$

Cutting speed

$$v_c = \frac{D_c \cdot \pi \cdot n}{1000} \quad [\text{m/min}]$$

Feed rate

$$v_f = n \cdot f \quad [\text{mm/min}]$$

Cut time

$$t_h = \frac{l_m}{f \cdot n} \quad [\text{min}]$$

n	speed	rpm
D_c	drill diameter	mm
v_c	cutting speed	m/min
v_f	feed rate	mm/min
f	feed per revolution	mm
t_h	cut time	min
l_m	length of cut	mm

Tensile strength	N/mm²	Rm
Vickers hardness HV	Diamond pyramid 136° Testing force F ≥ 98 N	HV
Brinell hardness HB Calculated from: HB = 0.95 x HV	0.102 x F/D² = 30 N/mm² F = testing force in N D = sphere diameter in mm	HB
Rockwell hardness C	Diamond cone 120° Overall testing force 1471 ± 9 N	HRC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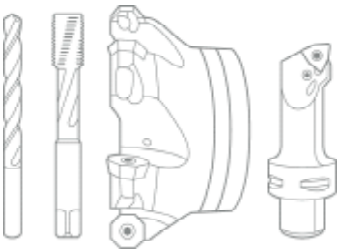

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WALTER

Product handbook

Grooving and recessing

_Walter Cut

Grooving and recessing experts



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Walter Cut:

Tiger·tec® grades for grooving and recessing

Completely innovative coatings and geometries achieve peak performances when grooving and parting off.
With this innovative development, it is possible for the first time to apply an aluminium oxide coating in a PVD process to carbide indexable inserts.



Tiger·tec® for Walter Cut

This PVD Tiger offers a previously unknown degree of toughness and wear resistance – which is particularly important in grooving operations.
In addition to this patented PVD **Tiger·tec®** coating and the proven CVD **Tiger·tec®** coating, there is a complete **Tiger·tec®** grade package available for the Walter Cut grooving system.

THE APPLICATION

- for grooving, parting off and recessing
- from unfavourable to stable conditions
- the Walter **Tiger·tec®** cutting materials cover the complete range of grooving

YOUR ADVANTAGES

- high productivity due to a reliable machining process
- high temperature resistance in conjunction with high toughness
- high cutting edge stability due to low coating temperature and at the same time offering high wear resistance
- smooth surface to reduce built-up cutting edges

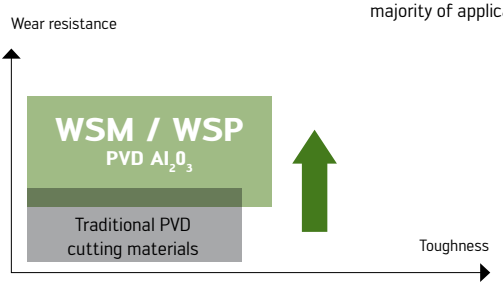
THE INSERT GRADES

WSP 43 – Tiger·tec® PVD Al_2O_3
- maximum toughness and process reliability for difficult to machine materials, steel and stainless steel
- the cutting material for unfavourable conditions, e.g., heavily interrupted cuts, very unstable clamping, unstable machines and low cutting speeds

WSM 33 – Tiger·tec® PVD Al_2O_3
- maximum resistance to wear and temperature for difficult to machine materials, steel and stainless steel
- the universal cutting material covers the majority of all applications

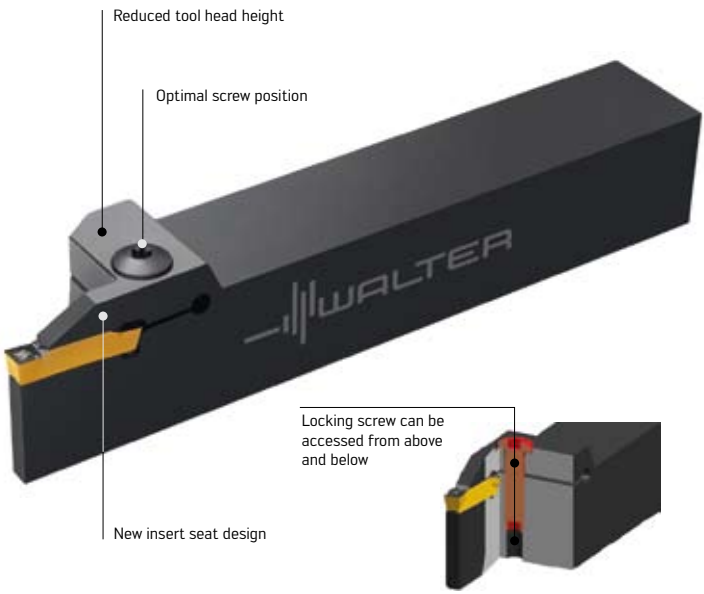
WPP 23 – Tiger·tec® CVD
- maximum hot hardness and wear resistance for steel
- for use in stable conditions in conjunction with high cutting speeds

WAK 20 – Tiger·tec® CVD
- the benchmark cutting tool material in cast iron machining
- the universal cutting material for the majority of applications



Walter Cut G1011:

One for all



Walter Cut monoblock toolholder G1011:

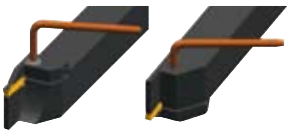
THE TOOL

- Walter Cut monoblock tools for grooving, parting off and turning.
- locking screw can be accessed from above and below
- reduced head height – easier chip evacuation possible
- for 2-cutting edge GX24 grooving insert
- insert widths 3, 4, 5, 6 mm
- cutting depths 12, 21 mm
- shank sizes 20x20, 25x25 mm

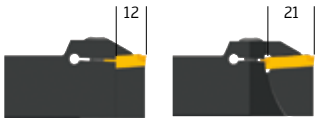
THE APPLICATION

- parting off of diameters up to 42 mm
- grooving and recessing operations up to a depth of 21 mm
- for use on lathes of all types
- first choice for all grooving operations

THE BENEFITS TO YOU AT A GLANCE



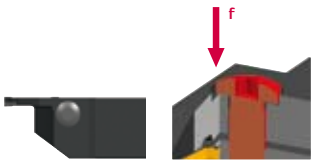
Simple handling in inverted use



Optimum stability due to two cutting depths



Simple chip evacuation due to reduced tool head height [h]



Greatest clamping force due to optimum screw position.

Driver grooving operations
[42CrMo4 (1.7225), ISO P]

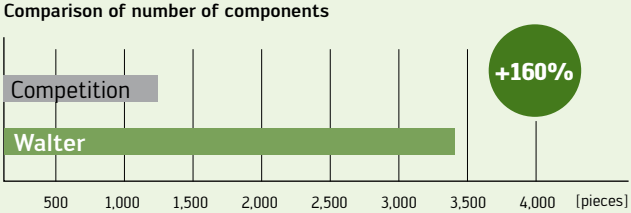
Tool:	G1011.2020R-6T12GX24
Grooving insert:	GX24-4E600 N050-UF4
Insert grade:	WPP 23
Machine:	Index MS32 multi-spindle machines, 4 kW

CUTTING DATA

v_c	230 m/min
f	0.25–0.30 mm
s	6 mm
T	8 mm

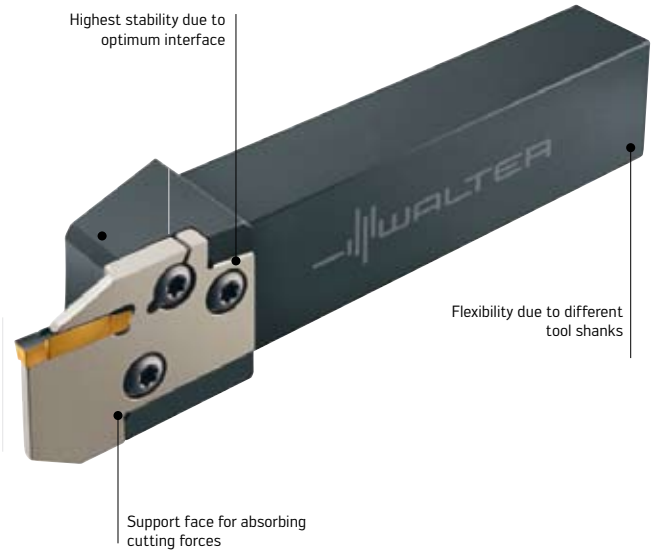
Number of cuts: 4

Comparison of number of components



Walter Cut Modular:

The quick-change artist



Walter Cut Modular tool NCBE

THE TOOL

- modular tooling system for parting off, grooving and recessing
- for insert widths of 0.6–9.7 mm
- over 800 variants possible
- greatest stability
- three different grooving systems can be used in the same base holder
- tools for internal and external machining

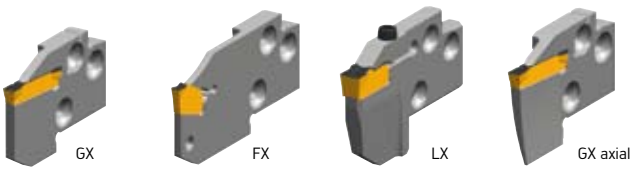
THE APPLICATION

- for radial and axial grooving
- for internal and external grooving
- for machining circlip grooves
- for use on lathes of all types

THE BENEFITS TO YOU AT A GLANCE



Square shank and Walter Capto tools available



The best grooving system for every machining operation

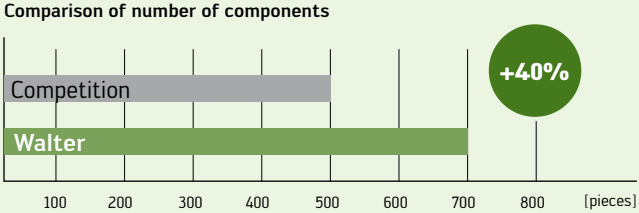
Pre-groove clamping nut
[42CrMo4 (1.7225), ISO P]

Tool:	NCAE 25–C400 R–GX16–2
Grooving insert:	GX16–2E300 N030–GD3
Insert grade:	WPP 23
Machine:	Index MS32
	multi-spindle machines, 4 kW

CUTTING DATA

v_c	130 m/min
f	0.15/0.05 mm
s	3 mm
T	5 mm
Number of cuts: 2	

Comparison of number of components



System overview

Walter Cut grooving and recessing tools

	Grooving / recessing					
	1st CHOICE 					
	G 1011		**NCAE / NCBE**		**XLCFN**	
	Page 10		Page 11		Page 12	
Shank size	s	Tmax	s	Tmax	s	Tmax
12 x 12			1.95–2.5	7		
			3.0–3.5	7		
16 x 16			1.95–2.5	7		
			3.0–3.5	7		
20 x 20	3	12/21	2.0–2.5	12		
	4	12/21	3.0–3.5	12		
	5	12/21	4.0–5.0	12		
	6	12/21				
25 x 25	3	12/21	2.0–2.5	12/21		
	4	12/21	3.0–3.5	12/21		
	5	12/21	4.0–5.0	12/21		
	6	12/21				
32 x 25			3.0–3.5	12/21	3	21
			4.0–5.0	12/21	4	21
			6.0	12/21	5	21
					6	21

s = cutting width / Tmax = max. grooving depth

Circlip grooves

1st CHOICE



NCCE

Page 20



NCAE

Page 11

	s	Tmax	s	Tmax	
	0.6–1.7	2	1.95–2.5	7	
			3.0–3.5	7	
	0.6–1.7	2	1.95–2.5	7	
			3.0–3.5	7	
	0.6–2.25	3	2.0–2.5	12	
			3.0–3.5	12	
			4.0–5.0	12	
	0.6–2.5	3	2.0–2.5	12	
			3.0–3.5	12	
			4.0–5.0	12	
	0.6–2.5	3	3.0–3.5	12	
			4.0–5.0	12	
			6.0	12	

G1011





s mm	T_{max} mm	$h = h_1$ mm	b mm	Designation	Type
3	12	20	20	G1011.2020 R/L–3T12 GX24	GX 24–2E3 . .
	12	25	25	G1011.2525 R/L–3T12 GX24	
	21	20	20	G1011.2020 R/L–3T21 GX24	
	21	25	25	G1011.2525 R/L–3T21 GX24	
4	12	20	20	G1011.2020 R/L–4T12 GX24	GX 24–3E4 . .
	12	25	25	G1011.2525 R/L–4T12 GX24	
	21	20	20	G1011.2020 R/L–4T21 GX24	
	21	25	25	G1011.2525 R/L–4T21 GX24	
5	12	20	20	G1011.2020 R/L–5T12 GX24	GX 24–3E5 . .
	12	25	25	G1011.2525 R/L–5T12 GX24	
	21	20	20	G1011.2020 R/L–5T21 GX24	
	21	25	25	G1011.2525 R/L–5T21 GX24	
6	12	20	20	G1011.2020 R/L–6T12 GX24	GX 24–4E6 . .
	12	25	25	G1011.2525 R/L–6T12 GX24	
	21	20	20	G1011.2020 R/L–6T21 GX24	
	21	25	25	G1011.2525 R/L–6T21 GX24	

For inserts see page 13/14.

NCAE





s mm	T_{max} mm	$h = h_1$ mm	b mm	Designation	Type
1.95–2.5	7	12	12	NCAE 12–1212 R/L–GX 09–1	GX 09–1 …
	7	16	16	NCAE 16–1616 R/L–GX 09–1	
3.0–3.5	7	12	12	NCAE 12–1212 R/L–GX 09–2	GX 09–2 …
	7	16	16	NCAE 16–1616 R/L–GX 09–2	
2.0–2.5	12	20	20	NCAE 20–2020 R/L–GX 16–1	GX 16–1 …
	12	25	25	NCAE 25–2525 R/L–GX 16–1	
3.0–3.5	12	20	20	NCAE 20–2020 R/L–GX 16–2	GX 16–2 …
	12	25	25	NCAE 25–2525 R/L–GX 16–2	
	12	32	25	NCAE 32–3225 R/L–GX 16–2	
4.0–5.0	12	20	20	NCAE 20–2020 R/L–GX 16–3	GX 16–3 …
	12	25	25	NCAE 25–2525 R/L–GX 16–3	
	12	32	25	NCAE 32–3225 R/L–GX 16–3	
6.0	12	25	25	NCAE 25–2525 R/L–GX 16–4	GX 16–4 …
	12	32	25	NCAE 32–3225 R/L–GX 16–4	
3.0	21	20	20	NCBE 20–2020 R/L–GX 24–2–21	GX 24–2 …
	21	25	25	NCBE 25–2525 R/L–GX 24–2–21	
4.0–5.0	21	25	25	NCBE 25–2525 R/L–GX 24–3–21	GX 24–3 …
	21	32	25	NCBE 32–3225 R/L–GX 24–3–21	
6.0	21	25	25	NCBE 25–2525 R/L–GX 24–4–21	GX 24–4 …
	21	32	25	NCBE 32–3225 R/L–GX 24–4–21	
8.0	21	25	25	NCBE 25–2525 R/L–GX 24–5–21	GX 24–5 …

For inserts see page 13/14 (circlip grooves p. 21).

These tools are also available as the Walter Capto version.
See the Walter general catalogue.

XLCFN





s mm	T_{max} mm	$h_3 = h_4$ mm	Designation	Type
3.0–3.5	21	32	XLCFN 3203–GX24–2S	GX 24–2 . . .
4.0–5.0	21	32	XLCFN 3204–GX24–3S	GX 24–3 . . .
6.0	21	32	XLCFN 3206–GX24–4S	GX 24–4 . . .

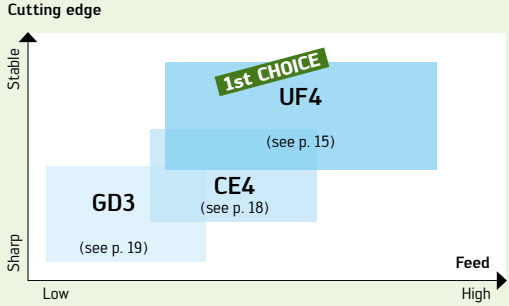
For inserts see page 13/14.



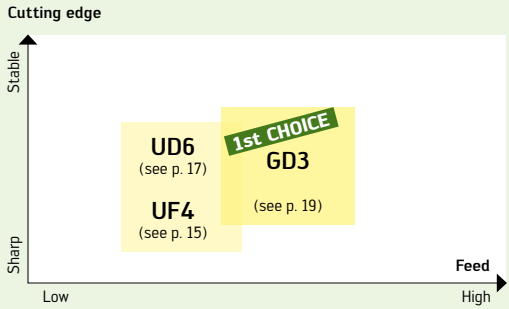
GX inserts for grooving

Geometry selection

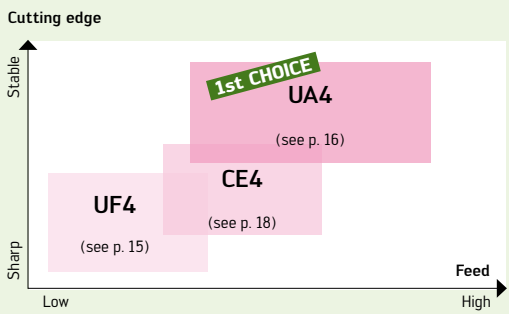
ISO P
Steel



ISO M
Stainless steel



ISO K
Cast iron

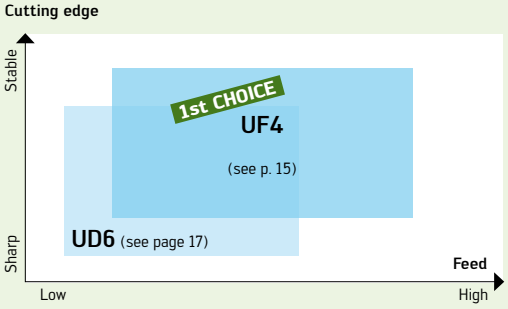




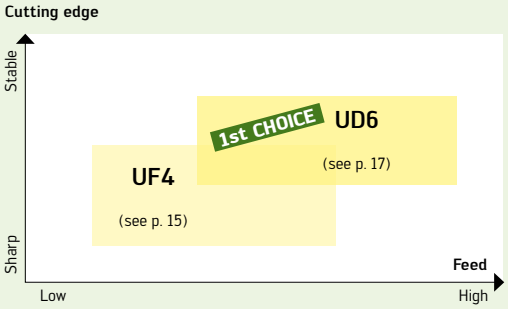
GX inserts for recessing

Geometry selection

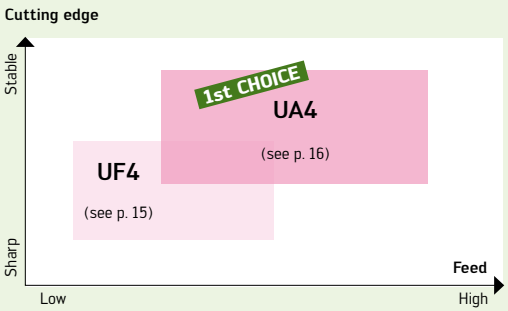
ISO P
Steel



ISO M
Stainless steel



ISO K
Cast iron

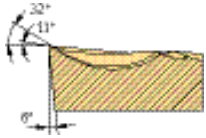


UF4 - the universal insert



THE RIGHT CUTTING EDGE FOR

- all grooving operations
- good chip control
- middle feed range
- positive cut



Cutting edge design

WALTER SELECT

Optimum indexable insert for:

good moderate poor

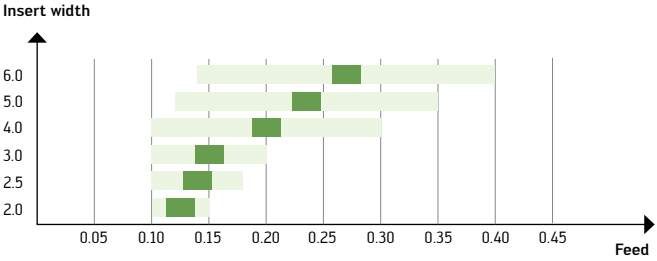
machining conditions

GX–UF4



Designation	l mm	s mm	r mm	ap_{max} mm	coated grades P WPP 23	P WSM 33	P WSP 43	M WSM 33	M WSP 43	K WPP 23	S WSM 33	S WSP 43
GX16–1E200 N020–UF4	16	2.0	0.2	2.5	☺	😐	☹	☺	☹	😐	😐	☹
GX16–1E250 N020–UF4	16	2.5	0.2	2.5	☺	😐	☹	☺	☹	😐	😐	☹
GX16–2E300 N030–UF4	16	3.0	0.3	3.0	☺	😐	☹	☺	☹	😐	😐	☹
GX16–3E400 N040–UF4	16	4.0	0.4	3.5	☺	😐	☹	☺	☹	😐	😐	☹
GX16–3E500 N040–UF4	16	5.0	0.4	3.5	☺	😐	☹	☺	☹	😐	😐	☹
GX16–4E600 N050–UF4	16	6.0	0.5	4.0	☺	😐	☹	☺	☹	😐	😐	☹
GX24–2E300 N030–UF4	24	3.0	0.3	3.0	☺	😐	☹	☺	☹	😐	😐	☹
GX24–3E400 N040–UF4	24	4.0	0.4	3.5	☺	😐	☹	☺	☹	😐	😐	☹
GX24–3E500 N040–UF4	24	5.0	0.4	3.5	☺	😐	☹	☺	☹	😐	😐	☹
GX24–4E600 N050–UF4	24	6.0	0.5	4.0	☺	😐	☹	☺	☹	😐	😐	☹

For cutting speed recommendations see page 24.

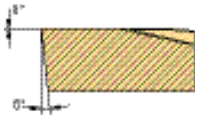


UA4 – the stable insert



THE RIGHT CUTTING EDGE FOR

- cast iron machining
- middle to high machining parameters
- the greatest process reliability in cast iron machining



Cutting edge design

WALTER SELECT

Optimum indexable insert for:

good moderate poor

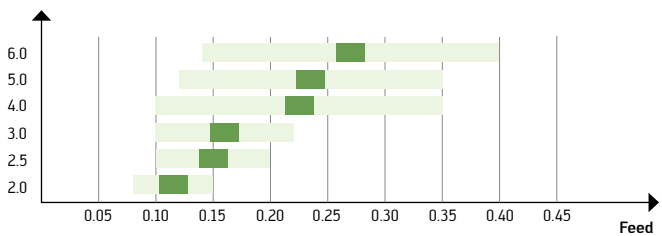
machining conditions

GX–UA4

Designation	l mm	s mm	r mm	ap_{max} mm	coated grades P WPP 23	P WSM 33	P WSP 43	M WSM 33	M WSP 43	K WAK 20	K WAK 30	K WPP 23
GX16–1E200 N020–UA4	16	2.0	0.2	2.5						☺	😐	
GX16–1E250 N020–UA4	16	2.5	0.2	2.5						☺	😐	
GX16–2E300 N030–UA4	16	3.0	0.3	3.0						☺	😐	
GX16–3E400 N040–UA4	16	4.0	0.4	3.5						☺	😐	
GX16–3E500 N040–UA4	16	5.0	0.4	3.5						☺	😐	
GX16–4E600 N050–UA4	16	6.0	0.5	4.0						☺	😐	
GX24–2E300 N030–UA4	24	3.0	0.3	2.5						☺	😐	
GX24–3E400 N040–UA4	24	4.0	0.4	3.0						☺	😐	
GX24–3E500 N040–UA4	24	5.0	0.4	3.0						☺	😐	
GX24–4E600 N050–UA4	24	6.0	0.5	3.5						☺	😐	

For cutting speed recommendations see page 24.

Insert width

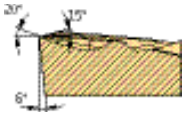


UD6 – the universal insert for machining stainless steel



THE RIGHT CUTTING EDGE FOR

- grooving in stainless steel
- medium feed range
- soft cutting action



Cutting edge design

WALTER SELECT

Optimum indexable insert for:

good moderate poor

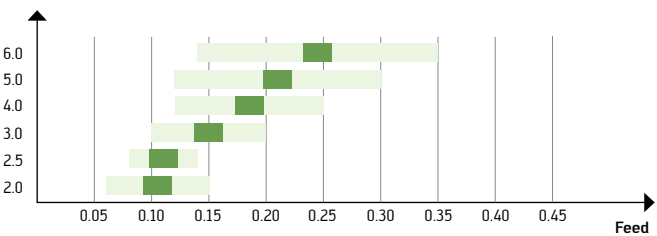
machining conditions

GX–UD6

Designation	l mm	s mm	r mm	ap_{max} mm	coated grades P WXM 33	P WPP 23	P WSP 43	M WAM 20	M WXM 33	K WPP 23	S WAM 20	S WSP 43
GX16–1E200 N020–UD6	16	2.0	0.2	2.5	☺			☺	☺		☺	
GX16–1E250 N020–UD6	16	2.5	0.2	2.5	☺			☺	☺		☺	
GX16–2E300 N030–UD6	16	3.0	0.3	3.0	☺			☺	☺		☺	
GX16–3E400 N040–UD6	16	4.0	0.4	3.5	☺			☺	☺		☺	
GX16–3E500 N040–UD6	16	5.0	0.4	3.5	☺			☺	☺		☺	
GX16–4E600 N050–UD6	16	6.0	0.5	4.0	☺			☺	☺		☺	
GX24–2E300 N030–UD6	24	3.0	0.3	2.5	☺			☺	☺		☺	
GX24–3E400 N040–UD6	24	4.0	0.4	3.0	☺			☺	☺		☺	
GX24–3E500 N040–UD6	24	5.0	0.4	3.0	☺			☺	☺		☺	
GX24–4E600 N050–UD6	24	6.0	0.5	3.5	☺			☺	☺		☺	

For cutting speed recommendations see page 24.

Insert width

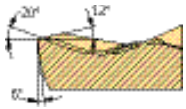


CE4 – the universal insert



THE RIGHT CUTTING EDGE FOR

- grooving and parting off operations
- moderate to high feeds
- good chip formation



Cutting edge design

WALTER SELECT

Optimum indexable insert for:

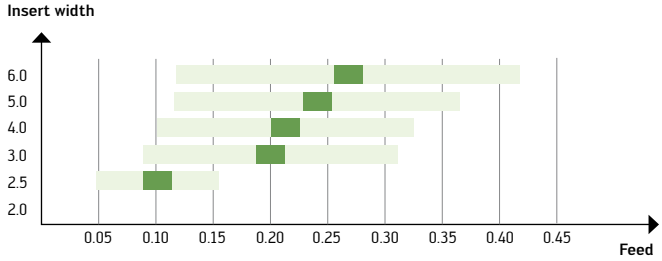
good | moderate | poor

machining conditions

GX–CE4

Designation	l mm	s mm	r mm	coated grades P WPP 23	P WSM 33	P WSP 43	M WSM 33	M WSP 43	K WPP 23	S WSM 33	S WSP 43
GX16–1E250 N020–CE4	16.6	2.5	0.2		☺	☹	☺	☹		☺	☹
GX16–2E300 N020–CE4	16.6	3.0	0.2		☺	☹	☺	☹		☺	☹
GX24–2E300 N020–CE4	24	3.0	0.2	☺	☺	☹	☺	☹	☺	☺	☹
GX24–3E400 N030–CE4	24	4.0	0.3	☺	☺	☹	☺	☹	☺	☺	☹
GX24–3E500 N030–CE4	24	5.0	0.3	☺	☺	☹	☺	☹	☺	☺	☹
GX24–4E600 N030–CE4	24	6.0	0.3	☺	☺	☹	☺	☹	☺	☺	☹

For cutting speed recommendations see page 24.

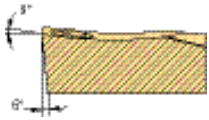


GD3 – the soft cutting insert



THE RIGHT CUTTING EDGE FOR

- very soft cutting action
- light to moderate feeds
- general parting off and grooving operations



Cutting edge design

WALTER SELECT

Optimum indexable insert for:

good moderate poor

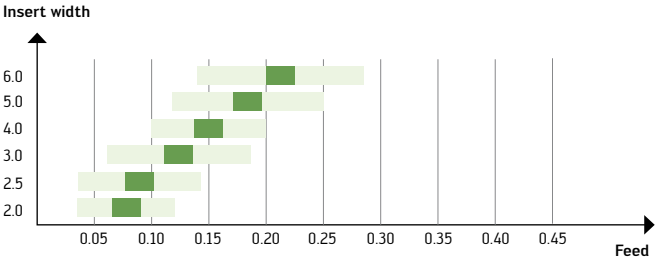
machining conditions

GX–GD3

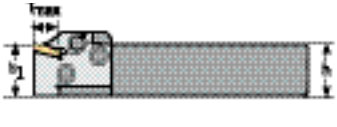


Designation	l mm	s mm	r mm	coated grades P WPP 23	P WSM 33	P WSP 43	M WSM 33	M WSP 43	K WPP 23	S WSM 33	S WSP 43
GX16–1E200 N020–GD3	16	2.0	0.2	☺	😐	☹	☺	☹	😐	😐	☹
GX16–1E250 N020–GD3	16	2.5	0.2	☺	😐	☹	☺	☹	😐	😐	☹
GX16–2E300 N030–GD3	16	3.0	0.3	☺	😐	☹	☺	☹	😐	😐	☹
GX16–3E400 N040–GD3	16	4.0	0.4	☺	😐	☹	☺	☹	😐	😐	☹
GX16–3E500 N040–GD3	16	5.0	0.4	☺	😐	☹	☺	☹	😐	😐	☹
GX16–4E600 N050–GD3	16	6.0	0.5	☺	😐	☹	☺	☹	😐	😐	☹
GX24–2E300 N030–GD3	24	3.0	0.3	☺	😐	☹	☺	☹	😐	😐	☹
GX24–3E400 N040–GD3	24	4.0	0.4	☺	😐	☹	☺	☹	😐	😐	☹
GX24–3E500 N040–GD3	24	5.0	0.4	☺	😐	☹	☺	☹	😐	😐	☹
GX24–4E600 N050–GD3	24	6.0	0.5	☺	😐	☹	☺	☹	😐	😐	☹

For cutting speed recommendations see page 24.



NCCE



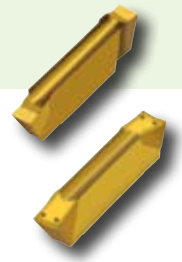


s mm	T_{max} mm	$h = h_1$ mm	b mm	Designation	Type
0.6–1.70	2	12	12	NCCE 12–1212 R/L–GX 09–1	GX 09–1 . . . R/L
	2	16	16	NCCE 16–1616 R/L–GX 09–1	
0.6–2.25	3	20	20	NCCE 20–2020 R/L–GX 16–2	GX 16–2 . . . R/L
	3	25	25	NCCE 25–2525 R/L–GX 16–2	
	3	32	25	NCCE 32–3225 R/L–GX 16–2	

For inserts see page 21.

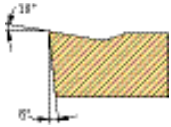
These tools are also available in the Walter Capto version.
See the Walter general catalogue.

Inserts for circlip grooves



THE RIGHT CUTTING EDGE FOR

- best surface quality
- all common circlip types
- minimal burr formation



Cutting edge design

WALTER SELECT

Optimum indexable insert for:

good moderate poor

machining conditions

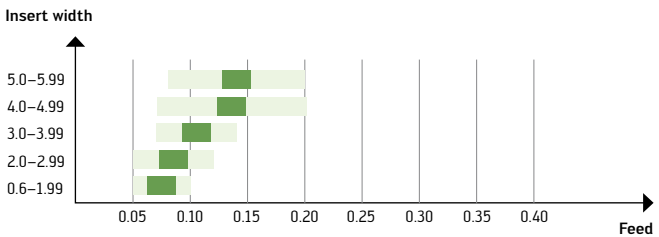
GX09

Designation	l mm	s mm	r mm	T_{max} mm	HC WTA 33
GX 09–1S0.60 R/L	9	0.60	—	0.75	☻
GX 09–1S0.80 R/L	9	0.80	—	0.94	☻
GX 09–1S0.90 R/L	9	0.90	—	1.04	☻
GX 09–1S1.00 R/L	9	1.00	—	1.14	☻
GX 09–1S1.20 R/L	9	1.20	—	1.34	☻
GX 09–1S1.40 R/L	9	1.40	—	1.53	☻
GX 09–1S1.70 R/L	9	1.70	—	1.82	☻
GX 09–1S1.95 N	9	1.95	0.1	—	☻
GX 09–1S2.25 N	9	2.25	0.1	—	☻
GX 09–2S2.75 N	9	2.75	0.1	—	☻
GX 09–2S3.25 N	9	3.25	0.1	—	☻

GX16

Designation	l mm	s mm	r mm	T_{max} mm	HC WTA 33
GX 16–2S0.60 R/L	16	0.60	—	0.75	☻
GX 16–2S0.80 R/L	16	0.80	—	0.94	☻
GX 16–2S0.90 R/L	16	0.90	—	1.04	☻
GX 16–2S1.00 R/L	16	1.00	—	1.14	☻
GX 16–2S1.20 R/L	16	1.20	—	1.34	☻
GX 16–2S1.40 R/L	16	1.40	—	1.53	☻
GX 16–2S1.70 R/L	16	1.70	—	1.82	☻
GX 16–2S1.95 R/L	16	1.95	—	2.07	☻
GX 16–2S2.25 R/L	16	2.25	—	2.36	☻
GX 16–2S2.75 N	16	2.75	0.1	—	☻
GX 16–2S3.25 N	16	3.25	0.1	—	☻
GX 16–3S4.25 N	16	4.25	0.2	—	☻
GX 16–4S5.25 N	16	5.25	0.2	—	☻

For cutting speed recommendations see page 24.



Insert grade application chart

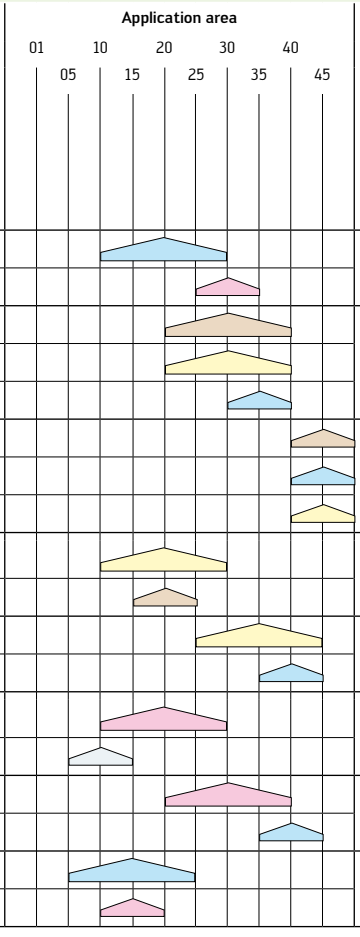
Grades of cutting material for grooving and recessing

Walter grade designation	Standard designation	Workpiece material group P steel	M Stainless steel	K Cast iron	N Non-ferrous metals	S Heat resistant alloys	H Hard materials
WPP 23	HC – P 20	●●					
	HC – K 30			●			
	HC – S 30					●●	
WSM 33	HC – M 30		●●				
	HC – P 35	●●					
	HC – S 45					●●	
WSP 43	HC – P 45	●●					
	HC – M 45		●●				
WAM 20	HC – M 20		●●				
	HC – S 20					●	
WXM 33	HC – M 35		●●				
	HC – P 40	●					
WAK 20	HC – K 20			●●			
	HC – H 10						●
WAK 30	HC – K 30			●●			
	HC – P 40	●					
WTA 33	HC – P 10	●●					
	HC – K 10			●			

HC = Coated carbide

●● Primary application

● Additional application



Coating process	Coating composition
CVD	TiCN + Al_2O_3 (+TiN)
PVD	TiAlN + Al_2O_3 (ZrCN)
PVD	TiAlN + Al_2O_3 (ZrCN)
CVD	TiCN + Al_2O_3 + HfN
PVD	Multilayer TiAlN / TiN +ZrCN
CVD	TiCN + Al_2O_3 (+TiN)
CVD	TiCN + Al_2O_3 (+TiN)
CVD	TiCN + Al_2O_3

Cutting data for Walter Cut – grooving and recessing – for coated carbide grades

Classification of the main material groups and code letters				Brinell hardness HB	Machining group[4]	
Material group	Workpiece material					
P	Unalloyed steel[1]	Approx. 0.15% C	annealed	125	1	
		Approx. 0.45% C	annealed	190	2	
		Approx. 0.45% C	tempered	250	3	
		Approx. 0.75% C	annealed	270	4	
		Approx. 0.75% C	tempered	300	5	
	Low-alloyed steel[1]	annealed		180	6	
		tempered		275	7	
		tempered		300	8	
		tempered		350	9	
	High-alloyed steel and high-alloyed tool steel[1]	annealed		200	10	
		hardened		325	11	
	Stainless steel[1]	annealed ferritic/martensitic		200	12	
		martensitic, tempered		240	13	
M	Stainless steel[1]	austenitic[2], quench hardened		180	14	
K	Grey cast iron	pearlitic/ferritic		180	15	
		pearlitic (martensitic)		260	16	
	Cast iron with spheroidal graphite	ferritic		160	17	
		pearlitic		250	18	
	Malleable cast iron	ferritic		130	19	
		pearlitic		230	20	
S	Heat resistant alloys	Fe based	annealed	200	31	
			hardened	280	32	
		Ni or Co based	annealed	250	33	
			hardened	350	34	
			cast	320	35	
	Titanium alloys	Alpha + Beta alloys, hardened		1050[3]	37	

[1] and cast steel

[2] and austenitic / ferritic

[3] Rm: tensile strength in MPa = N/mm²

[4] The machining group categories can be found in the Walter general catalogue.

	Cutting speed v_c [m/min]							
	WPP 23	WSM 33	WSP 43	WTA 33	WAM 20	WXM 33	WAK 20	WAK 30
	200					180	190	180
	180	170	160	180		180	180	170
	170	150	140	160		160	160	160
	150	140	130	150		130	160	150
	150	140	130	120		100	150	150
	180	160	150	180		160	160	160
	150	130	120	140		140	150	190
	150	110	100	150		130	140	150
	150	100	100	130		90	100	130
	130	120	110	180		100	180	160
	110	90	80	140			130	140
			140	180	180	170	180	180
			60	100	110	80	130	110
		150	130	150	160	140		
	200			150			300	280
	160			120			280	260
	200			240			300	280
	160			190			260	240
	180			80			150	120
	150			60			130	100
		90	90					
		40	40					
		70	70					
		60	60					
		60	60					
		35	35					

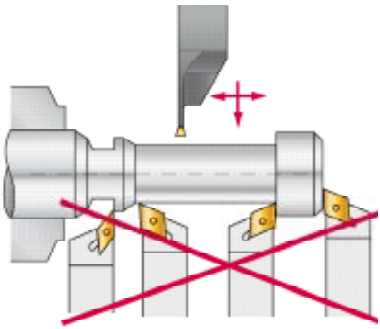
User Guide – grooving/recessing

Basic principles

General

The use of recessing tools allows machining steps to be grouped together saving on the number of tools used.

These tools are used in particular for machining between shoulders or when tool positions are limited.



A form-fit connection between the insert and insert seat enables both radial and axial forces to be absorbed.



This allows grooving and longitudinal turning operations when special chip forming geometries are used.



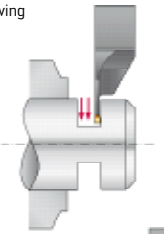
Production strategy

We always distinguish between two production strategies:
grooving and recessing.

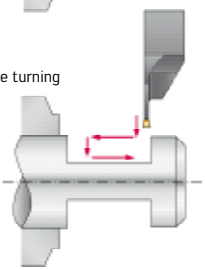
For **grooving**, the feed moves in only one direction.
Longitudinal turning with a small stock removal (ca. 0.1–0.3 mm) takes place only as a finishing pass.

Recessing is a combination of grooving and longitudinal turning movements.

Grooving



Groove turning



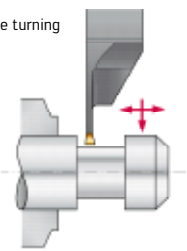
Grooving or recessing?

The choice of machining strategy depends on the shape and size of the groove to be produced. As a rule of thumb, the following criteria can be used to make a decision:

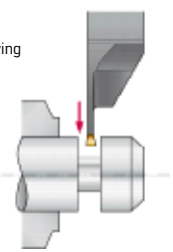
Groove-turning:
The groove width is 1.5 times greater than the groove depth

Grooving:
The groove depth is 1.5 times greater than the groove width

Groove turning



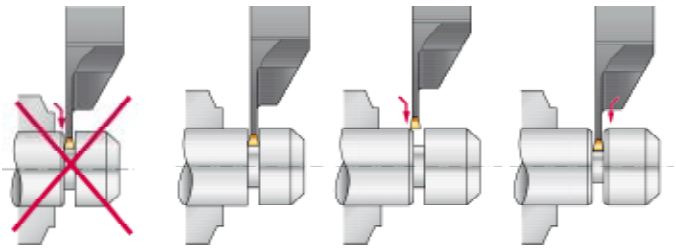
Grooving



User tips

For grooving, only one cutting edge is used.
Here, it is also necessary to adhere to certain machining sequences after machining to achieve an optimum result.

Producing a small groove with chamfer

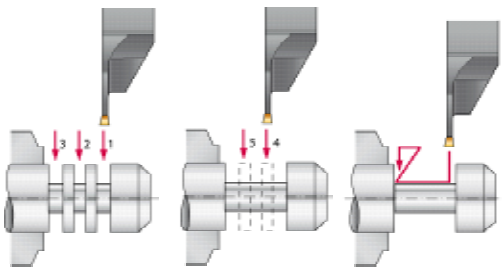


Grooving with 0.1 mm allowance on diameter

Turn the chamfer and finish 1st edge

Turn the chamfer and finish 2nd edge

Producing a wide groove using grooving



Pre-groove
Web width = s–2xr

Pre-groove

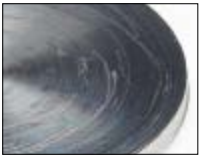
Finishing
ap_{max} = r

s = edge width / r = corner radius / ap_{max} = max. cut depth

Fault analysis



Poor surface
- → align coolant to cutting edge
- → select geometry offering greater chip formation
- → increase the cutting speed
- → use a smaller corner radius
- → use more positive geometry



Swarf damage
- → use a geometry offering greater chip formation
- → lower the cutting speed

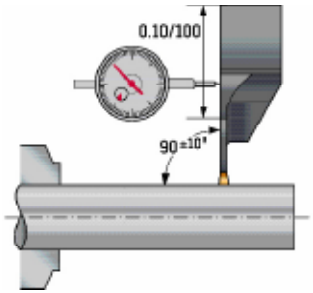


Poor chip formation
- → lower the cutting speed
- → improve coolant
- → check the geometry

Basic principles

Tool must be aligned 90° to the axis of rotation.

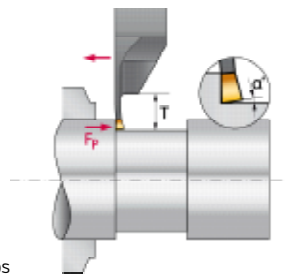
This is the only way to guarantee that a clearance angle can be generated when the groove is turned in both directions. Poor tool alignment leads to vibration and can cause tool breakage.



Deflection

Deflection means the movement of the insert support blade caused by a force [F_P]. This deflection is required in order to generate an adjacent clearance angle [α] during the longitudinal turning operation.
The degree of deflection is influenced by multiple factors:

- Cut depth [a_p]
- Feed [f]
- Cutting speed [v_c]
- Corner radius [r]
- Workpiece material to be machined
- Cutting depth of the tool [T]
- Width of the insert support blade

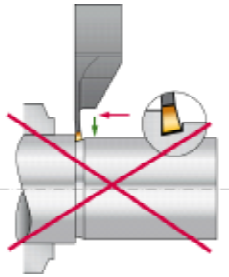


Diameter compensation
The deflection causes different longitudinal ratios on the tool. In order to generate an even diameter during finishing, a diameter compensation must take place at the transition from grooving to the longitudinal turning movement.

1. Pre-machine component (including finishing)
2. Groove to the final diameter
3. Pull back 0.1 mm
4. Turn longitudinally
5. Measure the groove diameter and turned diameter and correct the pullback dimension (0.1 mm) by the difference in diameter.

User tips

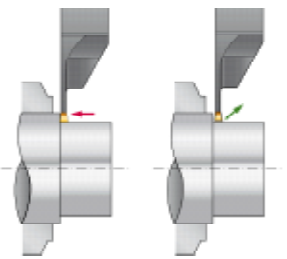
Groove turning



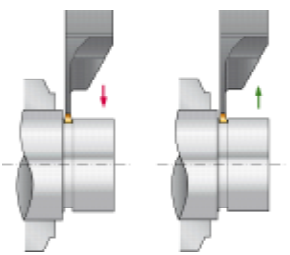
In order to ensure a safe machining process, certain tool paths must be adhered to.
For instance, a tool must not be stressed by cutting in two directions at the same time. At all times, ensure that the cutting edge is relieved after grooving before you start the longitudinal turning operation. Transitions from longitudinal turning to grooving requires the cutting edge to be relieved in the same way.

Machining sequence

At the end of the longitudinal turning operation, pull back against the direction of feed and away from the machined diameter at least 0.1 mm. This clearance allows the cutting edge to return to its original position.



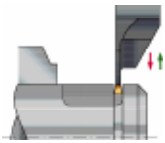
The next grooving operation can now follow.
Before you transition to the longitudinal turning operation at this point, pull back 0.1 mm again.



User tips

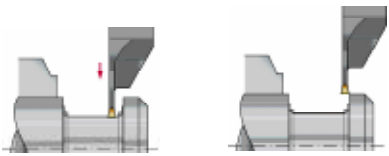
Cutting a recess

1. Rough



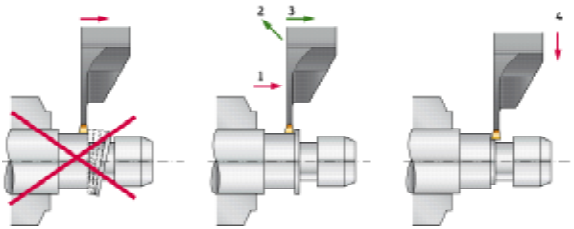
1. Groove (to a depth equal to the longitudinal turning depth of cut)
2. Retract 0.1 mm radially
3. Turn longitudinally
4. Retract 0.1 mm in both X and Z axis

2. Finish

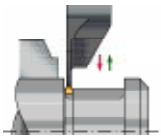


1. Pregroove on radius and retract to final diameter

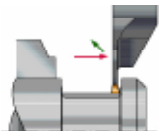
Avoiding ring formation



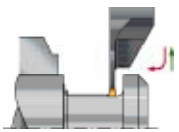
1. Turn longitudinally to approximately 0.5-1.5 mm before the shoulder
2. Retract diagonally from the corner
3. Position the tool above the ring
4. Remove the ring by a radial grooving operation



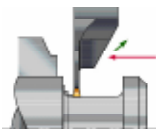
5. Groove
6. Pull back 0.1 mm



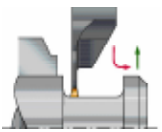
7. Turn longitudinally to approximately 0.5 mm before the shoulder
8. Lift 0.1 mm in two directions



2. Finish the 1st shoulder and generate the radius
3. Retract by the diameter compensation dimension

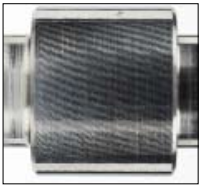


4. Turn longitudinally to the start of the radius
5. Retract 0.1 mm in both X and Y axis



6. Finish the 2nd shoulder and generate the radius

Fault analysis



Vibration during machining
- → check tool alignment (see page 30)
- → deflection of cutting edge too low (see page 30)
- → use narrower insert (easier to deflect)
- → use a smaller corner radius
- → shorten workplace overhang



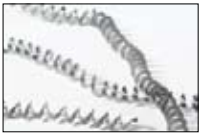
Step in cutting diameter
- → correct pullback dimension before finishing cut
- → ensure even allowance
- → check whether the insert seat is damaged
- → increase the cutting speed
- → use a more positive geometry



Damage due to swarf
- → use a geometry with greater chip forming capability
- → lower the cutting speed
- → optimise coolant



Ring formation
- → check program sequence (see page 32)



Poor chip formation
- → lower the cutting speed
- → increase the feed
- → improve coolant
- → check the geometry

User Guide – grooving/recessing

Wear analysis



Flank face wear
- → use a more wear-resistant grade
- → reduce the cutting speed
- → improve coolant



Plastic deformation
- → use a more wear-resistant grade
- → reduce feed
- → optimise coolant
- → reduce the cutting speed



Chipping
- → use tougher grades of carbide
- → use a more rigid tool
- → use stronger geometries
- → use wider inserts if necessary



Built-up cutting edge
- → increase the cutting speed
- → use a more positive geometry
- → optimise coolant



Crater wear
- → reduce the cutting speed
- → use a more positive geometry
- → use a more wear-resistant grade
- → optimise coolant



Chamfer or oxidation wear
- → reduce the cutting speed
- → reduce feed

Hardness comparison table

Tensile strength, Brinell, Vickers and Rockwell hardness (extract from DIN 50150)

Tensile strength [N/mm²]	Vickers hardness	Brinell hardness	Rockwell hardness
Rm	HV	HB	HRC
255	80	76.0	
270	85	80.7	
285	90	85.5	
305	95	90.2	
320	100	95.0	
335	105	99.8	
350	110	105	
370	115	109	
385	120	114	
400	125	119	
415	130	124	
430	135	128	
450	140	133	
465	145	138	
480	150	143	
495	155	147	
510	160	152	
530	165	156	
545	170	162	
560	175	166	
575	180	171	
595	185	176	
610	190	181	
625	195	185	
640	200	190	
660	205	195	
675	210	199	
690	215	204	
705	220	209	
720	225	214	
740	230	219	
755	235	223	
770	240	228	20.3
785	245	233	21.3
800	250	238	22.2
820	255	242	23.1
835	260	247	24.0
850	265	252	24.8
865	270	257	25.6
880	275	261	26.4

Tensile strength [N/mm²]	Vickers hardness	Brinell hardness	Rockwell hardness
Rm	HV	HB	HRC
900	280	266	27.1
915	285	271	27.8
930	290	276	28.5
950	295	280	29.2
965	300	285	29.8
995	310	295	31.0
1,030	320	304	32.2
1,060	330	314	33.3
1,095	340	323	34.4
1,125	350	333	35.5
1,155	360	342	36.6
1,190	370	352	37.7
1,220	380	361	38.8
1,255	390	371	39.8
1,290	400	380	40.8
1,320	410	390	41.8
1,350	420	399	42.7
1,385	430	409	43.6
1,420	440	418	44.5
1,455	450	428	45.3
1,485	460	437	46.1
1,520	470	447	46.9
1,555	480	(456)	47.7
1,595	490	(466)	48.4
1,630	500	(475)	49.1
1,665	510	(485)	49.8
1,700	520	(494)	50.5
1,740	530	(504)	51.1
1,775	540	(513)	51.7
1,810	550	(523)	52.3
1,845	560	(532)	53.0
1,880	570	(542)	53.6
1,920	580	(551)	54.1
1,955	590	(561)	54.7
1,995	600	(570)	55.2

Tensile strength [N/mm²]	Vickers hardness	Brinell hardness	Rockwell hardness
Rm	HV	HB	HRC
2,030	610	(580)	55.7
2,070	620	(589)	56.3
2,105	630	(599)	56.8
2,145	640	(608)	57.3
2,180	650	(618)	57.8
	660		58.3
	670		58.8
	680		59.2
	690		59.7
	700		60.1
	720		61.0
	740		61.8
	760		62.5
	780		63.3
	800		64.0
	820		64.7
	840		65.3
	860		65.9
	880		66.4
	900		67.0
	920		67.5
	940		68.0

The hardness values converted i.a.w. these tables are approximate only. See DIN 50150.

Speed

$$n = \frac{v_c \cdot 1000}{D_c \cdot \pi} \quad [\text{min}^{-1}]$$

Cutting speed

$$v_c = \frac{D_c \cdot \pi \cdot n}{1000} \quad [\text{m/min}]$$

Feed rate

$$v_f = n \cdot f \quad [\text{mm/min}]$$

Time in cut

$$t_h = \frac{l_m}{f \cdot n} \quad [\text{min}]$$

n	speed	rpm
D_c	drill diameter	mm
v_c	cutting speed	m/min
v_f	feed rate	mm/min
f	feed per revolution	mm
t_h	time in cut	min
l_m	length of cut	mm

Tensile strength	N/mm²	Rm
Vickers hardness HV	Diamond pyramid 136° Testing force F ≥ 98 N	HV
Brinell hardness HB Calculated from: HB = 0.95 x HV	0.102 x F/D² = 30 N/mm² F = testing force in N D = sphere diameter in mm	HB
Rockwell hardness C	Diamond cone 120° Overall testing force 1471 ± 9 N	HRC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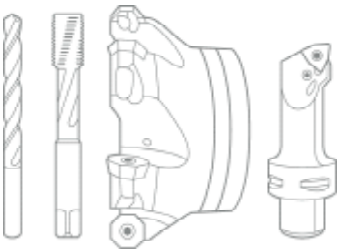

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