WALTER

Product Handbook

Boring/drilling

_ WALTER XTRA·TEC® INSERT DRILL

Tool Innovations in Drilling

Tiger·tec® Silver

WALTER TIGER·TEC® SILVER – THE NEW POWER IN MACHINING

CONTENTS

Walter Xtra·tec® Insert Drill: Very exact, very efficient, very economical

THE TOOL

- Drill with four edged inserts
- Ø range from 13,5–59 mm
- Z = 1 effective
- Drilling depth: 2 x D, 3 x D, 4 x D and 5 x D
- Ideal insert position provides a balance of forces in the machining process
- Optimised flute for better chip removal and strong body
- Hard-nickel plated surface brings protection from corrosion and wear and provides better chip flow
- Improved handling and better clamping and release torque through use of TorxPlus screw
- Cylindrical collar for easy measurement of tool diameter

THE APPLICATION

- For all steel and cast iron workpieces and for stainless materials and materials that are difficult to machine
- For drilling, spot drilling on angled or convex surfaces, chain drilling
- Extremely suitable for general mechanical engineering, automotive and mass production industry and for the aerospace industry

Xtra·tec® Insert Drill

Tiger·tec® Silver

Xtra·tec®

YOUR ADVANTAGES

– Productivity is increased due to higher cutting parameters
– Low hole tolerance due to optimum balance of forces
– Cost reduction:
  - 4 usable cutting edges
  - Higher cutting parameters
  - Saving of additional subsequent operations
– Excellent surface finish quality due to wiper edge insert at periphery
– High process reliability due to positive locking of the insert

types: B4212, B4213, B4214, B4215

Walter Xtra·tec® Insert Drill: The productive cartridge solution

THE TOOL

– Drill with four edged inserts
– Z = 1 effective
– Cartridge design (1 centre + 1-x periphery)
– Ø range of 59–120 mm (standard up to 80 mm)
– Adjustable diameter, nominal size +0.6 mm
– Drilling depth 1 x D_C up to 5 x D_C (standard 3 x D_C)
– Walter NCT interface for modular design
– Ideal insert position provides a balance of forces in the machining process
– Hard-nickel plated surface brings protection from corrosion and wear and provides better chip flow
– Improved handling and better clamping and release torque through use of TorxPlus screw
– Cylindrical collar for easy measurement of tool diameter

THE APPLICATION

– For all steel and cast iron workpieces and for stainless materials and materials that are difficult to machine
– For drilling, spot drilling on angled or convex surfaces, chain drilling
– Extremely suitable for general mechanical engineering, automotive and mass production industry and for the aerospace industry

YOUR ADVANTAGES

– Productivity is increased due to higher cutting parameters
– High level of flexibility due to the Walter modular system
– Cost reduction:
  • 4 usable cutting edges
  • Higher cutting parameters
  • Cartridge design
– Excellent surface finish quality due to wiper edge insert at periphery
– High process reliability due to positive locking of the insert

WALTER XPRESS

– Here Walter Xpress can provide tools in the Ø range of 59–120 mm and in lengths of up to 5 x D_C
– The available standard cartridges (see ordering info) cover this entire range
– Short delivery times can be achieved because of the modular design
– The NCT interface ensures a modular tool design and fitting in almost any machine spindle

Tiger·tec® Silver

Xtra·tec®

Xtra·tec® Insert Drill

Cartridge: FR743C-6

Cartridge: FR744P-6

Cartridge: FR746P-6

Application example 1:
Connecting rod machining

Tool

Designation:	B4212-5898410
Indexable insert:	P4840P-3R-E57 / P4841C-3R-E57
Grade:	**WKP25S / WKP35S**
Diameter:	23,7 mm

Workpiece

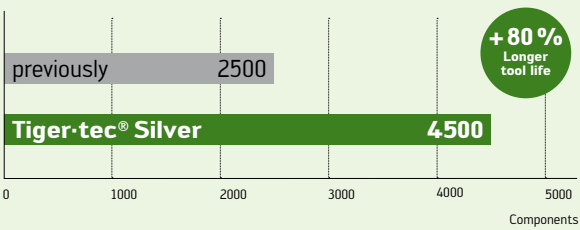
Designation:	Connecting rod
Material:	C70
Drilling depth:	30 mm

Cutting data:

	existing	Tiger·tec® Silver
v_c	210 m/min	210 m/min
n	2820 rpm	2820 rpm
f_z	0,08 mm/rev	0,08 mm/rev
v_f	226 mm/min	226 mm/min
Z	1	1
Tool life	2500 components	4500 components

Your advantages:
– Tool life increase from 2500 pieces to 4500 pieces
– Increased tool life and reliability
– Better surface finish quality

Comparison between number of components



Application example 2:
Flex Link machining

Tool

Designation:	B4214.F40.40.Z1.160R-6
Indexable insert:	P4848P-6R-E57 / P4841C-6R-E57
Grade:	**WKP35S / WXP40**
Diameter:	40 mm

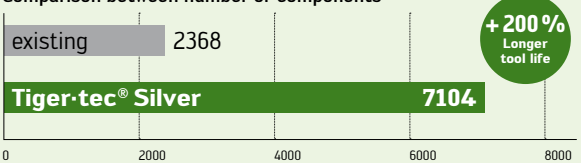
Workpiece

Designation:	Flex Link
Material:	1,72
Drilling depth:	148 mm

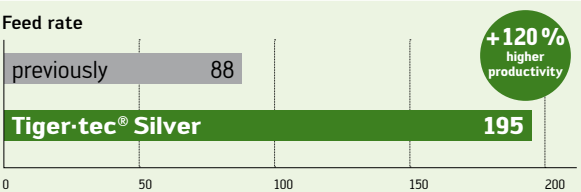
Cutting data:	**existing**	**Tiger·tec® Silver**
v_c	220 m/min	163 m/min
n	1751 rpm	1297 rpm
f_z	0,05 mm/rev	0,15 mm/rev
v_f	88 mm/min	195 mm/min
Z	1	1
Machining time	101 sec	46 sec
Tool life	2368 components	7104 components

Your advantages:
- + 200 % longer tool life
- + 120 % higher productivity
- spare machine capacity
- better process reliability

Comparison between number of components



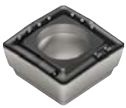
Feed rate



Application example 3:
Connecting rod machining

Tool

Designation:	B4212-5642880
Indexable insert:	P4841P-5R-E57 / P4841C-5R-E57
Grade:	**WKP25S / WKP35S**
Diameter:	31,5 mm



Workpiece

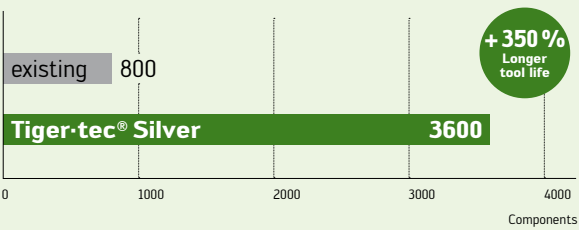
Designation:	Connecting rod
Material:	36MnVS4
Drilling depth:	20 mm

Cutting data:

	existing	Tiger·tec® Silver
v_c	120 m/min	140 m/min
n	1200 rpm	1400 rpm
f_z	0,21 mm/rev	0,18 mm/rev
v_f	250 mm/min	250 mm/min
Z	1	1
Tool life	800 components	3600 components

Your advantages:
– Tool life increase from 800 pieces to 3600 pieces
– No vibration
– Better surface finish quality
– Increased tool life and reliability

Comparison between number of components



Application example 4:
Clutch cover machining

Tool

Designation:	B4212-5538329
Indexable insert:	P4840P-3R-A57 / P4841C-3R-A57
Grade:	**WKP35S / WXP40**
Diameter:	22 mm

Workpiece

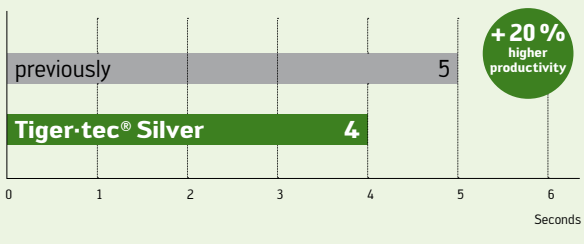
Designation:	Clutch cover
Material:	GGG-40
Drilling depth:	15 mm

Cutting data:

	existing	Tiger·tec® Silver
v_c	120 m/min	130 m/min
n	1737 rpm	1880 rpm
f_z	0,1 mm/rev	0,12 mm/rev
v_f	174 mm/min	226 mm/min
Z	1	1
Machining time	5 sec	4 sec

Your advantages:
– + 20 % higher productivity with same tool life
– with same tool life
– No vibration
– Faster cycle times achieved reliably

Machining time



Walter Xtra·tec® Insert Drill: Very exact, very efficient, very economical

THE OUTER INSERT

– Circumference-sintered version with corner radius at periphery
– Circumference fully ground version: Wiper insert at periphery provides extremely good surface finish quality
– **Tiger·tec® Silver:** the cutting tool material for maximum cutting speed and maximum process reliability

THE CENTRE INSERT

– **Tiger·tec® Silver:** the cutting tool material for maximum tool life and maximum process reliability when drilling in ISO P and ISO K materials
– New: new PVD grade **WXP40** for longer tool life when drilling in ISO P, ISO M and ISO S materials
– Specially designed for the requirements of a centre insert

Tiger·tec® Silver

THE GEOMETRY VARIANTS

A 57 – The stable one

- 0° rake angle
- For unfavourable machining conditions, mainly for cast iron and steel materials

E 57 – The universal one

- 13° rake angle
- For moderate machining conditions
- For cast iron and steel, but also for stainless materials and materials that are difficult to cut

E 67 – The special one

- 13° rake angle
- Special geometry for optimum chip formation
- For long-chipping materials such as St37, stainless materials, materials that are difficult to cut and aluminium

Walter Select for indexable inserts for drilling: Step by step to the right indexable insert

STEP 1
Determine the **material** to be machined from page H 8 onwards in the Walter general catalogue.
Note the machining group that corresponds to your material e.g.: P10.

Identification letters	Machining group	Groups of the materials to be machined	
P	P1–P15	Steel	All types of steel and cast steel, with the exception of steel with an austenitic structure
M	M1–M3	Stainless steel	Stainless austenitic steel and austenitic-ferritic steel and cast steel
K	K1–K7	Cast iron	Grey cast iron, cast iron with spheroidal graphite, malleable cast iron, cast iron with vermicular graphite
N	N1–N10	NF metals	Aluminium and other non-ferrous metals, non-ferrous materials
S	S1–S10	High temperature alloys and titanium alloys	Heat resisting special alloys based on iron, nickel and cobalt, titanium and titanium alloys
H	H1–H4	Hard materials	Hardened steel, hardened cast iron materials, chilled cast iron
O	O1–O6	Other	Plastics, fibre glass and carbon fibre reinforced plastics, graphite

STEP 2
Select the **machining conditions**:

Tool projection	Machine stability, clamping system and workpiece		
	very good	good	moderate
Short projection length			
Long projection length			

STEP 3

Select your **tool** according to your application and individual requirements.

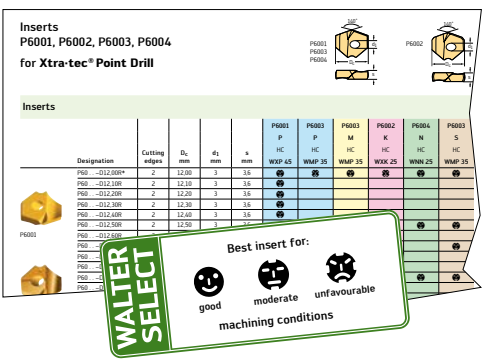
Then select your drill from the corresponding tool page.

Drilling depth	Handbook page
2 x D_c	28
3 x D_c	32
4 x D_c	36
5 x D_c	40

STEP 4

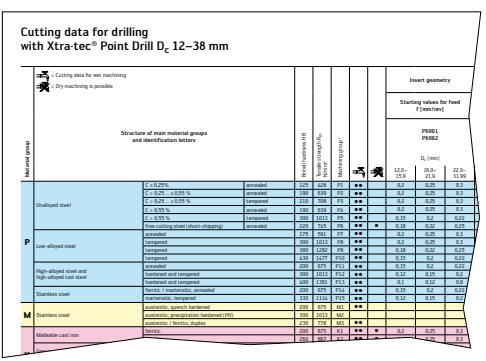
Determine your best **indexable index grade** and **-geometry** on the relevant tool page.

In so doing, please take into consideration the machining conditions (step 2) and the material to be machined.



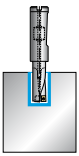
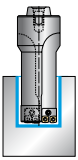
STEP 5

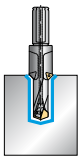
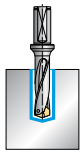
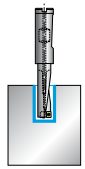
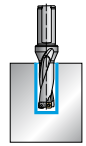
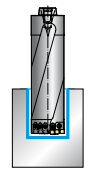
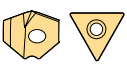
Select the **cutting data** from page 46 onwards in this handbook.



Walter Select – Drilling
Walter Xtra·tec® Insert Drill and Point Drill

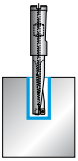
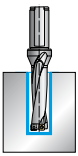
Tool type

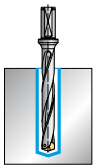
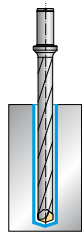
L_c approx.	1,3 x D_c	2 x D_c		
	B 4011 (R)	**B 3212 (R)**	**B 4212 (R)**	**B 3011.M (R)**
Drill (R) = right handed	 **Xtra·tec®**		 **Xtra·tec®**	
Ø range [mm]	12–25	10–18	13,5–59	59,5–120
Walter general catalogue page	C 50	C 16	Handbook page 28	C 58
P Steel	●●	●●	●●	●●
M Stainless steel	●●	●●	●●	●
K Cast iron	●●	●●	●●	●●
N NF metals	●●	●	●	●
S Difficult-to-cut materials	●●	●●	●●	●
H Hard materials				
O Other				
Basic insert shape				
Insert types	P 600 . .	LCMX . .	P 484 . .	P 284 . .
Drilling depth [mm]	≤ 1,3 x D_c	≤ 2 x D_c	≤ 2 x D_c	≤ 2 x D_c

	2,5 x D_c	3 x D_c			
	B 4012C (R)	B 4013 (R)	B 3213 (R)	B 4213 (R)	B 4213.N
					
	Xtra·tec®	Xtra·tec®		Xtra·tec®	Xtra·tec®
	12–29	12–37	10–18	13,5–59	59,5–120
	C 60	C 62	C 70	Handbook page 32	Handbook page 44
	●●	●●	●●	●●	●●
	●●	●●	●●	●●	●
	●●	●●	●●	●●	●●
	●●	●●	●	●	●
	●●	●●	●●	●●	●
					
	P 600 . . TC . .	P 600 . .	LCMX . .	P 484 . .	P 484 . .
	≤ 2,5 x D_c	≤ 3 x D_c	≤ 3 x D_c	≤ 3 x D_c	≤ 3 x D_c

Walter Select – Drilling
Walter Xtra·tec® Insert Drill and Point Drill

Tool type

L_c approx.	4 x D_c		5 x D_c		
	B 3214 (R)	**B 4214 (R)**	**B 4015 (R)**	**B 4215 (R)**	
Drill (R) = right handed			 **Xtra·tec®**	 **Xtra·tec®**	
Ø range [mm]	10–18	16–59	12–37	16–59	
Walter general catalogue page	C 78	Handbook page 36	C 80	Handbook page 40	
P Steel		●●	●●	●●	
M Stainless steel		●	●●		
K Cast iron	●●	●●	●●	●●	
N NF metals	●	●	●●	●	
S Difficult-to-cut materials		●	●		
H Hard materials					
O Other					
Basic insert shape					
Insert types	LCMX . .	P 484 . .	P 600 . .	P 484 . .	
Drilling depth [mm]	≤ 4 x D_c	≤ 4 x D_c	≤ 5 x D_c	≤ 5 x D_c	

	7 x D_c	10 x D_c
	B 4017 (R)	B 4010 (R)
		
	Xtra·tec®	Xtra·tec®
	12–31	18–24
	C 86	C 88
	●●	●●
	●	●●
	●●	●●
	●	●
	●	
		
	P 600 . .	P 600 . .
	≤ 7 x D_c	≤ 10 x D_c

Designation key for indexable inserts P 484 .

P 484	0	P	–	2	R	–	A57	WKP 35S
1	2	3		4	5		6	7

1	2	3	4
Walter indexable insert designation	**0** ground **1** sintered	**C** Centre insert **P** Outer insert	Insert size

5	6	7
R Right handed	Walter geometry **A 57** The stable one **E 57** The universal one **E 67** The sharp one	Walter cutting material grade

Designation key for Xtra·tec® Insert Drill

B 421	2.	F25	24.	Z1.	048	R	–	3
1	2	3	4	5	6	7		8

1
Walter indexable insert designation

2
2 2 x D_C
3 3 x D_C
4 4 x D_C
5 5 x D_C

3
Shank variant and diameter, e.g.:
F 25 metric, Ø 25
UF 31 inches, Ø 1¼"
N 8 NCT 80

4
Nominal diameter [mm]

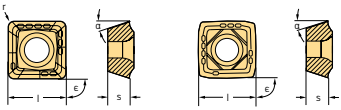
5
Effective number of teeth

6
Drilling depth [mm]

7
R right version

8
Insert size

Square
P 484 .
Tiger·tec®



Indexable inserts

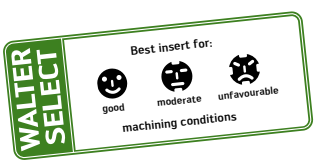
Designation	Number of cutting edges	l mm	s mm	r mm	α	ε	P HC WKP25 S	P HC WKP35 S	P WSP45	M HC WSP45	K WAK15	K HC WKP25 S	K HC WKP35 S	S HC WSP45	HC WXP40
 Outer insert															
P4840P-1R-A57	4	4,55	1,96	0,29	11°	90°	●	●	●	●		●	●	●	
P4840P-2R-A57	4	5,52	2,38	0,34	11°	90°	●	●	●	●		●	●	●	
P4840P-3R-A57	4	6,5	2,8	0,4	11°	90°	●	●	●	●		●	●	●	
P4840P-4R-A57	4	7,8	3,36	0,48	11°	90°	●	●	●	●		●	●	●	
P4840P-5R-A57	4	9,56	4,12	0,59	11°	90°	●	●	●	●		●	●	●	
P4840P-6R-A57	4	11,75	4,87	0,7	11°	90°	●	●	●	●		●	●	●	
P4840P-7R-A57	4	14,03	5,53	0,8	11°	90°	●	●	●	●		●	●	●	
P4840P-8R-A57	4	16,5	5,53	1,0	11°	90°	●	●	●	●		●	●	●	
 Outer insert															
P4840P-1R-E57	4	4,55	1,96	0,29	11°	90°	●	●	●	●		●	●	●	
P4840P-2R-E57	4	5,52	2,38	0,34	11°	90°	●	●	●	●		●	●	●	
P4840P-3R-E57	4	6,5	2,8	0,4	11°	90°	●	●	●	●		●	●	●	
P4840P-4R-E57	4	7,8	3,36	0,48	11°	90°	●	●	●	●		●	●	●	
P4840P-5R-E57	4	9,56	4,12	0,59	11°	90°	●	●	●	●		●	●	●	
P4840P-6R-E57	4	11,75	4,87	0,7	11°	90°	●	●	●	●		●	●	●	
P4840P-7R-E57	4	14,03	5,53	0,8	11°	90°	●	●	●	●		●	●	●	
P4840P-8R-E57	4	16,5	5,53	1,0	11°	90°	●	●	●	●		●	●	●	

HC = Coated carbide

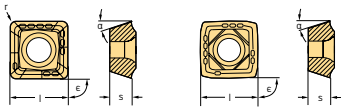
Indexable inserts

Designation	Number of cutting edges	l mm	s mm	r mm	α	ε	P HC WKP25 S	P HC WKP35 S	P WSP45	M HC WSP45	K WAK15	K HC WKP25 S	K HC WKP35 S	S HC WSP45	HC WXP40
 Outer insert															
P4840P-1R-E67	4	4,55	1,96	0,29	11°	90°		☺	😐	😐			☺	😐	
P4840P-2R-E67	4	5,52	2,38	0,34	11°	90°		☺	😐	😐			☺	😐	
P4840P-3R-E67	4	6,5	2,8	0,4	11°	90°		☺	😐	😐			☺	😐	
P4840P-4R-E67	4	7,8	3,36	0,48	11°	90°		☺	😐	😐			☺	😐	
P4840P-5R-E67	4	9,56	4,12	0,59	11°	90°		☺	😐	😐			☺	😐	
P4840P-6R-E67	4	11,75	4,87	0,7	11°	90°		☺	😐	😐			☺	😐	
P4840P-7R-E67	4	14,03	5,53	0,8	11°	90°		☺	😐	😐			☺	😐	
P4840P-8R-E67	4	16,5	5,53	1,0	11°	90°		☺	😐	😐			☺	😐	
 Outer insert															
P4841P-1R-A57	4	4,55	1,96	0,29	11°	90°	☺	😐	😐	😐		☺	😐	😐	
P4841P-2R-A57	4	5,52	2,38	0,34	11°	90°	☺	😐	😐	😐		☺	😐	😐	
P4841P-3R-A57	4	6,5	2,8	0,4	11°	90°	☺	😐	😐	😐		☺	😐	😐	
P4841P-4R-A57	4	7,8	3,36	0,48	11°	90°	☺	😐	😐	😐		☺	😐	😐	
P4841P-5R-A57	4	9,56	4,12	0,59	11°	90°	☺	😐	😐	😐		☺	😐	😐	
P4841P-6R-A57	4	11,75	4,87	0,7	11°	90°	☺	😐	😐	😐		☺	😐	😐	
P4841P-7R-A57	4	14,03	5,53	0,8	11°	90°	☺	😐	😐	😐		☺	😐	😐	
P4841P-8R-A57	4	16,5	5,53	1,0	11°	90°	☺	😐	😐	😐		☺	😐	😐	

HC = Coated carbide



Square
P 484 .
Tiger·tec®



Indexable inserts

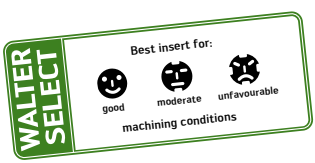
Designation	Number of cutting edges	l mm	s mm	r mm	α	ε	P HC WKP25 S	P HC WKP35 S	P WSP45	M HC WSP45	K HC WAK15	K HC WKP25 S	K HC WKP35 S	S HC WSP45	HC WXP40
 Outer insert															
P4841P-1R-E57	4	4,55	1,96	0,29	11°	90°	●	●	●	●		●	●	●	
P4841P-2R-E57	4	5,52	2,38	0,34	11°	90°	●	●	●	●		●	●	●	
P4841P-3R-E57	4	6,5	2,8	0,4	11°	90°	●	●	●	●		●	●	●	
P4841P-4R-E57	4	7,8	3,36	0,48	11°	90°	●	●	●	●		●	●	●	
P4841P-5R-E57	4	9,56	4,12	0,59	11°	90°	●	●	●	●		●	●	●	
P4841P-6R-E57	4	11,75	4,87	0,7	11°	90°	●	●	●	●		●	●	●	
P4841P-7R-E57	4	14,03	5,53	0,8	11°	90°	●	●	●	●		●	●	●	
P4841P-8R-E57	4	16,5	5,53	1,0	11°	90°	●	●	●	●		●	●	●	
 Centre insert															
P4841C-1R-A57	4	4,9	1,96	0,29	11°	90°		●					●		●
P4841C-2R-A57	4	5,95	2,38	0,34	11°	90°		●					●		●
P4841C-3R-A57	4	7,0	2,8	0,4	11°	90°		●					●		●
P4841C-4R-A57	4	8,4	3,36	0,48	11°	90°		●					●		●
P4841C-5R-A57	4	10,29	4,12	0,59	11°	90°		●					●		●
P4841C-6R-A57	4	12,24	4,87	0,7	11°	90°		●					●		●
P4841C-7R-A57	4	14,69	5,53	0,8	11°	90°		●					●		●
P4841C-8R-A57	4	17,49	5,53	1,0	11°	90°		●					●		●

HC = Coated carbide

Indexable inserts

Designation	Number of cutting edges	l mm	s mm	r mm	α	ε	P HC WKP25 S	P HC WKP35 S	P WSP45	M HC WSP45	K HC WAK15	K HC WKP25 S	K HC WKP35 S	S HC WSP45	HC WXP40
 Centre insert															
P4841C-1R-E57	4	4,9	1,96	0,29	11°	90°		●					●		●
P4841C-2R-E57	4	5,95	2,38	0,34	11°	90°		●					●		●
P4841C-3R-E57	4	7,0	2,8	0,4	11°	90°		●					●		●
P4841C-4R-E57	4	8,4	3,36	0,48	11°	90°		●					●		●
P4841C-5R-E57	4	10,29	4,12	0,59	11°	90°		●					●		●
P4841C-6R-E57	4	12,24	4,87	0,7	11°	90°		●					●		●
P4841C-7R-E57	4	14,69	5,53	0,8	11°	90°		●					●		●
P4841C-8R-E57	4	17,49	5,53	1,0	11°	90°		●					●		●
 Centre insert															
P4840C-1R-E67	4	4,9	1,96	0,29	11°	90°		●					●		●
P4840C-2R-E67	4	5,95	2,38	0,34	11°	90°		●					●		●
P4840C-3R-E67	4	7,0	2,8	0,4	11°	90°		●					●		●
P4840C-4R-E67	4	8,4	3,36	0,48	11°	90°		●					●		●
P4840C-5R-E67	4	10,29	4,12	0,59	11°	90°		●					●		●
P4840C-6R-E67	4	12,24	4,87	0,7	11°	90°		●					●		●
P4840C-7R-E67	4	14,69	5,53	0,8	11°	90°		●					●		●
P4840C-8R-E67	4	17,49	5,53	1,0	11°	90°		●					●		●

HC = Coated carbide



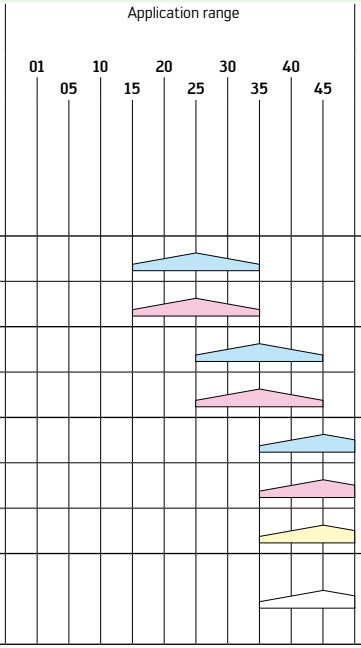
Cutting tool material application tables

Grades for drilling

Walter Grade designation	Standard designation	Workpiece material group P Steel	M Stainless steel	K Cast iron	N NF metals	S Difficult-to-cut materials	H Hard materials
WKP25S	HC – P25	●●					
	HC – K25			●●			
WKP35S	HC – P35	●●					
	HC – K35			●●			
	HC – P45	●●					
WSP45	HC – M45		●●				
	HC – S45					●●	
WXP40	HC – P45	●●	●●	●●		●●	

HC = Coated carbide

●● Primary application
● Other application

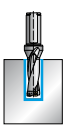
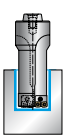


Coating process	Coating structure
CVD	TiCN + Al_2O_3 (+TiCN)
CVD	TiCN + Al_2O_3 (+TiCN)
PVD	TiAlN + Al_2O_3 (ZrCN)
PVD	Multilayer TiAlN / TiN

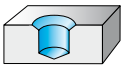
Walter drill:
Product range overview of drilling and boring tools with indexable inserts

Drilling

Walter Select see GC page C 46

L_C = 1,3 x D_C	L_C = 2 x D_C		L_C = 3 x D_C		
D_C = 12–25 mm **B 4011** GC page C 50 **Xtra·tec®** 			D_C = 12–38 mm **B 4013** GC page C 62 **Xtra·tec®** 		
	D_C = 13,5–59 mm **B 4212** HB page 28 **Xtra·tec®** 		D_C = 13,5–59 mm **B 4213** HB page 32 **Xtra·tec®** 	D_C = 59–120 mm **B 4213.N** HB page 44 **Xtra·tec®** 	
	D_C = 10–18 mm **B 3212** GC page C 16 	D_C = 59,8–120 mm **B 3011M** GC page C 58 	D_C = 10–18 mm **B 3213** GC page C 70 	D_C = 16–58 mm **B 3213** GC page C 70 	

Walter Select see GC page C 46

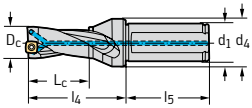


Walter Select
see GC page C 46

	L_C = 4 x D_C	L_C = 5 x D_C	L_C = 7 x D_C	L_C = 10 x D_C	L_C = 2 x D_C
		D_C = 12–38 mm **B 4015** GC page C 80 **Xtra·tec®**	D_C = 12–32 mm **B 4017** GC page C 86 **Xtra·tec®**	D_C = 18–25 mm **B 4010** GC page C 88 **Xtra·tec®**	D_C = 12–29 mm **B 4012C** GC page C 60 **Xtra·tec®**
	D_C = 17–59 mm **B 4214** HB page 36 **Xtra·tec®**	D_C = 17–59 mm **B 4215** HB page 40 **Xtra·tec®**			
	D_C = 16–58 mm **B 3214** GC page C 78				

HB: This page information relates to this handbook.
GC: This page information relates to the Walter general catalogue 2012.

Drill
B 4212
Xtra·tec® Insert Drill

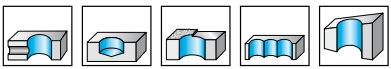


Parallel shank with flat in acc. with ISO 9766

- Diameter range 13,5–59 mm
- Right handed
- Drilling depth 2 x D_c

Designation	D_c mm	d_1 mm	d_4 mm	l_4 mm	l_5 mm	L_c mm	kg	No. of indexable inserts	Type
B4212.F20.13,5.Z1.027R-1	13,5	20	30	47	50	27	0,17	1/1	
B4212.F20.14.Z1.028R-1	14	20	30	48	50	28	0,17	1/1	P484 . P-1R P484 . C-1R
B4212.F20.14,5.Z1.029R-1	14,5	20	30	49	50	29	0,17	1/1	
B4212.F20.15.Z1.030R-1	15	20	30	50	50	30	0,17	1/1	
B4212.F20.15,5.Z1.031R-1	15,5	20	30	51	50	31	0,18	1/1	
B4212.F25.16.Z1.032R-1	16	25	32	57	56	32	0,32	1/1	
B4212.F25.16,5.Z1.033R-2	16,5	25	32	58	56	33	0,3	1/1	
B4212.F25.17.Z1.034R-2	17	25	32	59	56	34	0,42	1/1	
B4212.F25.17,5.Z1.035R-2	17,5	25	32	60	56	35	0,4	1/1	P484 . P-2R P484 . C-2R
B4212.F25.18.Z1.036R-2	18	25	32	61	56	36	0,33	1/1	
B4212.F25.18,5.Z1.037R-2	18,5	25	32	62	56	37	0,45	1/1	
B4212.F25.19.Z1.038R-2	19	25	32	63	56	38	0,34	1/1	
B4212.F25.19,5.Z1.039R-2	19,5	25	32	64	56	39	0,35	1/1	
B4212.F25.20.Z1.040R-2	20	25	32	65	56	40	0,45	1/1	
B4212.F25.20,5.Z1.041R-3	20,5	25	32	66	56	41	0,44	1/1	
B4212.F25.21.Z1.042R-3	21	25	32	67	56	42	0,45	1/1	
B4212.F25.21,5.Z1.043R-3	21,5	25	32	68	56	43	0,37	1/1	
B4212.F25.22.Z1.044R-3	22	25	32	69	56	44	0,37	1/1	P484 . P-3R P484 . C-3R
B4212.F25.22,5.Z1.045R-3	22,5	25	32	70	56	45	0,46	1/1	
B4212.F25.23.Z1.046R-3	23	25	32	71	56	46	0,48	1/1	
B4212.F25.23,5.Z1.047R-3	23,5	25	32	72	56	47	0,44	1/1	
B4212.F25.24.Z1.048R-3	24	25	32	73	56	48	0,48	1/1	
B4212.F25.24,5.Z1.049R-4	24,5	25	32	74	56	49	0,5	1/1	
B4212.F25.25.Z1.050R-4	25	25	32	75	56	50	0,4	1/1	
B4212.F32.25,5.Z1.051R-4	25,5	32	40	83	60	51	0,8	1/1	
B4212.F32.26.Z1.052R-4	26	32	40	84	60	52	0,8	1/1	
B4212.F32.26,5.Z1.053R-4	26,5	32	40	85	60	53	0,8	1/1	P484 . P-4R P484 . C-4R
B4212.F32.27.Z1.054R-4	27	32	40	86	60	54	0,7	1/1	
B4212.F32.27,5.Z1.055R-4	27,5	32	40	87	60	55	0,8	1/1	
B4212.F32.28.Z1.056R-4	28	32	40	88	60	56	0,8	1/1	
B4212.F32.28,5.Z1.057R-4	28,5	32	40	89	60	57	0,8	1/1	
B4212.F32.29.Z1.058R-4	29	32	40	90	60	58	0,9	1/1	

Bodies, assembly parts and screwdrivers are included in the standard pack. Important: Where through bores are created by a rotating tool, a disc forms which is ejected. Please implement safety measures.



Assembly parts

	D_c mm	13,5-16	16,5-20	20,5-24	24,5-29
	Clamping screw for insert Tightening torque	FS2120 (Torx 6 IP) 0,4 Nm	FS2111 (Torx 7 IP) 0,9 Nm	FS1454 (Torx 8 IP) 1,2 Nm	FS1457 (Torx 9 IP) 2,0 Nm

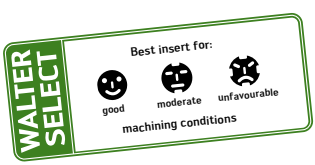
Accessories

	D_c mm	13,5-20	20,5-24	24,5-29
	Torque screwdriver	FS2001	FS2001	FS2003
	Interchangeable blade	FS2011 (Torx 7 IP)	FS2012 (Torx 8 IP)	FS2013 (Torx 9 IP)

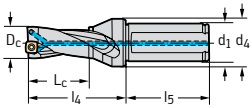
Indexable inserts

	Designation	Size	P HC					M HC		K HC				N HC		S HC			H	HC
			WKP25 S	WKP35 S	WSP45	WMP35	WXP45	WSP45	WMP35	WKP25 S	WKP35 S	WXK25		WNN25		WSP45	WMP35			WXP40
 Outer insert	P4840P– . R–A57	1–4	☺	😐	☹			😐		😐	☹					😐				
	P4840P– . R–E57	1–4	☺	😐	☹			😐		😐	☹					😐				
	P4840P– . R–E67	1–4	☺	😐	☹			😐								😐				
	P4841P– . R–A57	1–4	☺	😐	☹			😐		😐	☹					😐				
	P4841P– . R–E57	1–4	☺	😐	☹			😐		😐	☹					😐				
 Centre insert	P4841C– . R–A57	1–4		☹							☹									☹
	P4841C– . R–E57	1–4		☹							☹									☹
	P4840C– . R–E67	1–4		☹							☹									☹

HC = Coated carbide



Drill
B 4212
Xtra·tec® Insert Drill

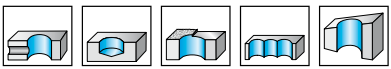


Parallel shank with flat in acc. with ISO 9766

- Diameter range 13,5–59 mm
- Right handed
- Drilling depth 2 x D_c

Designation	D_c mm	d_1 mm	d_4 mm	l_4 mm	l_5 mm	L_c mm	kg	No. of indexable inserts	Type
B4212.F32.29,5.Z1.059R-5	29,5	32	40	91	60	59	0,7	1/1	
B4212.F32.30.Z1.060R-5	30	32	40	92	60	60	0,7	1/1	
B4212.F32.31.Z1.062R-5	31	32	40	94	60	62	0,8	1/1	P484. P-5R P484. C-5R
B4212.F32.32.Z1.064R-5	32	32	40	96	60	64	0,8	1/1	
B4212.F32.33.Z1.066R-5	33	32	40	98	60	66	0,8	1/1	
B4212.F32.34.Z1.068R-5	34	32	40	100	60	68	0,8	1/1	
B4212.F32.35.Z1.070R-5	35	32	40	102	60	70	0,9	1/1	
B4212.F32.36.Z1.072R-6	36	32	40	104	60	72	0,8	1/1	
B4212.F40.37.Z1.074R-6	37	40	50	114	70	74	1,4	1/1	
B4212.F40.38.Z1.076R-6	38	40	50	116	70	76	1,4	1/1	P484. P-6R P484. C-6R
B4212.F40.39.Z1.078R-6	39	40	50	118	70	78	1,4	1/1	
B4212.F40.40.Z1.080R-6	40	40	50	120	70	80	1,5	1/1	
B4212.F40.41.Z1.082R-6	41	40	50	122	70	82	1,5	1/1	
B4212.F40.42.Z1.084R-6	42	40	50	124	70	84	1,6	1/1	
B4212.F40.43.Z1.086R-7	43	40	50	126	70	86	1,5	1/1	
B4212.F40.44.Z1.088R-7	44	40	50	128	70	88	1,6	1/1	
B4212.F40.45.Z1.090R-7	45	40	50	130	70	90	1,6	1/1	
B4212.F40.46.Z1.092R-7	46	40	50	132	70	92	1,7	1/1	P484. P-7R P484. C-7R
B4212.F40.47.Z1.094R-7	47	40	50	134	70	94	1,7	1/1	
B4212.F40.48.Z1.096R-7	48	40	50	136	70	96	1,8	1/1	
B4212.F40.49.Z1.098R-7	49	40	50	138	70	98	1,8	1/1	
B4212.F40.50.Z1.100R-7	50	40	50	140	70	100	1,9	1/1	
B4212.F40.51.Z1.102R-8	51	40	50	142	70	102	1,9	1/1	
B4212.F40.52.Z1.104R-8	52	40	50	144	70	104	2	1/1	
B4212.F40.53.Z1.106R-8	53	40	50	146	70	106	2	1/1	
B4212.F40.54.Z1.108R-8	54	40	50	148	70	108	2,1	1/1	P484. P-8R P484. C-8R
B4212.F40.55.Z1.110R-8	55	40	50	150	70	110	2,2	1/1	
B4212.F40.56.Z1.112R-8	56	40	50	152	70	112	2,2	1/1	
B4212.F40.57.Z1.114R-8	57	40	50	154	70	114	2,3	1/1	
B4212.F40.58.Z1.116R-8	58	40	50	156	70	116	2,4	1/1	
B4212.F40.59.Z1.118R-8	59	40	50	158	70	118	2,5	1/1	

Bodies, assembly parts and screwdrivers are included in the standard pack. Important: Where through bores are created by a rotating tool, a disc forms which is ejected. Please implement safety measures.



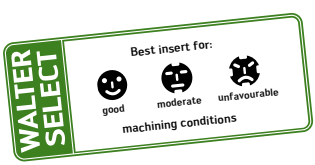
Assembly parts	D_c mm	29,5-35	36-42	43-59
	Clamping screw for insert Tightening torque	FS2080 (Torx 15 IP) 2,5 Nm	FS1453 (Torx 15 IP) 3,5 Nm	FS1495 (Torx 20 IP) 5,0 Nm

Accessories	D_c mm	29,5-42	43-59
	Torque screwdriver	FS2003	FS2003
	Interchangeable blade	FS2014 (Torx 15 IP)	FS2015 (Torx 20 IP)

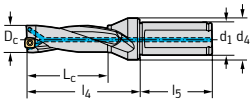
Indexable inserts

	Designation	Size	P HC					M HC		K HC				N HC		S HC			H	HC
			WKP25 S	WKP35 S	WSP45	WMP35	WXP45	WSP45	WMP35	WKP25 S	WKP35 S	WXK25	WNN25			WSP45	WMP35			WXP40
 Outer insert	P4840P– . R–A57	5–8	☺	😐	☹			😐		😐	☹					😐				
	P4840P– . R–E57	5–8	☺	😐	☹			😐		😐	☹					😐				
	P4840P– . R–E67	5–8	☺	😐	☹			😐		😐	☹					😐				
	P4841P– . R–A57	5–8	☺	😐	☹			😐		😐	☹					😐				
	P4841P– . R–E57	5–8	☺	😐	☹			😐		😐	☹					😐				
 Centre insert	P4841C– . R–A57	5–8		☹							☹									☹
	P4841C– . R–E57	5–8		☹							☹									☹
	P4840C– . R–E67	5–8		☹							☹									☹

HC = Coated carbide



Drill
B 4213
Xtra·tec® Insert Drill

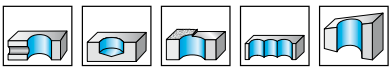


Parallel shank with flat in acc. with ISO 9767

– Diameter range 13,5–59 mm
– Right handed
– Drilling depth 3 x D_c

Designation	D_c mm	d_1 mm	d_4 mm	l_4 mm	l_5 mm	L_c mm	kg	No. of indexable inserts	Type
B4213.F20.13,5.Z1.040R-1	13,5	20	30	61	50	40,5	0,17	1/1	
B4213.F20.14.Z1.042R-1	14	20	30	62	50	42	0,18	1/1	P484 . P-1R P484 . C-1R
B4213.F20.14,5.Z1.043R-1	14,5	20	30	64	50	43,5	0,18	1/1	
B4213.F20.15.Z1.045R-1	15	20	30	65	50	45	0,18	1/1	
B4213.F20.15,5.Z1.046R-1	15,5	20	30	67	50	46,5	0,19	1/1	
B4213.F25.16.Z1.048R-1	16	25	32	73	56	48	0,33	1/1	
B4213.F25.16,5.Z1.049R-2	16,5	25	32	75	56	49,5	0,44	1/1	
B4213.F25.17.Z1.051R-2	17	25	32	76	56	51	0,43	1/1	
B4213.F25.17,5.Z1.052R-2	17,5	25	32	77,5	56	52,5	0,44	1/1	
B4213.F25.18.Z1.054R-2	18	25	32	79	56	54	0,43	1/1	P484 . P-2R P484 . C-2R
B4213.F25.18,5.Z1.055R-2	18,5	25	32	80,5	56	55,5	0,46	1/1	
B4213.F25.19.Z1.057R-2	19	25	32	82	56	57	0,46	1/1	
B4213.F25.19,5.Z1.058R-2	19,5	25	32	84	56	58,5	0,47	1/1	
B4213.F25.20.Z1.060R-2	20	25	32	85	56	60	0,48	1/1	
B4213.F25.20,5.Z1.061R-3	20,5	25	32	87	56	61,5	0,5	1/1	
B4213.F25.21.Z1.063R-3	21	25	32	88	56	63	0,4	1/1	
B4213.F25.21,5.Z1.064R-3	21,5	25	32	90	56	64,5	0,5	1/1	
B4213.F25.22.Z1.066R-3	22	25	32	91	56	66	0,42	1/1	P484 . P-3R P484 . C-3R
B4213.F25.22,5.Z1.067R-3	22,5	25	32	93	56	67,5	0,5	1/1	
B4213.F25.23.Z1.069R-3	23	25	32	94	56	69	0,43	1/1	
B4213.F25.23,5.Z1.070R-3	23,5	25	32	96	56	70,5	0,5	1/1	
B4213.F25.24.Z1.072R-3	24	25	32	97	56	72	0,44	1/1	
B4213.F25.24,5.Z1.073R-4	24,5	25	32	99	56	73,5	0,5	1/1	
B4213.F25.25.Z1.075R-4	25	25	32	100	56	75	0,6	1/1	
B4213.F32.25,5.Z1.076R-4	25,5	32	40	109	60	76,5	0,8	1/1	
B4213.F32.26.Z1.078R-4	26	32	40	110	60	78	0,8	1/1	
B4213.F32.26,5.Z1.079R-4	26,5	32	40	112	60	79,5	0,9	1/1	P484 . P-4R P484 . C-4R
B4213.F32.27.Z1.081R-4	27	32	40	113	60	81	0,9	1/1	
B4213.F32.27,5.Z1.082R-4	27,5	32	40	115	60	82,5	0,9	1/1	
B4213.F32.28.Z1.084R-4	28	32	40	116	60	84	0,8	1/1	
B4213.F32.28,5.Z1.085R-4	28,5	32	40	118	60	85,5	0,9	1/1	
B4213.F32.29.Z1.087R-4	29	32	40	119	60	87	0,9	1/1	

Bodies, assembly parts and screwdrivers are included in the standard pack. Important: Where through bores are created by a rotating tool, a disc forms which is ejected. Please implement safety measures.



Assembly parts

D_c mm	13,5-16	16,5-20	20,5-24	24,5-29
Clamping screw for insert Tightening torque	FS2120 (Torx 6 IP) 0,4 Nm	FS2111 (Torx 7 IP) 0,9 Nm	FS1454 (Torx 8 IP) 1,2 Nm	FS1457 (Torx 9 IP) 2,0 Nm

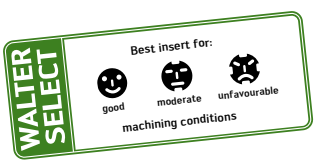
Accessories

D_c mm	13,5-20	20,5-24	24,5-29
Torque screwdriver	FS2001	FS2001	FS2003
Interchangeable blade	FS2011 (Torx 7 IP)	FS2012 (Torx 8 IP)	FS2013 (Torx 9 IP)

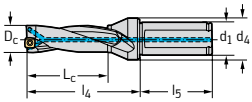
Indexable inserts

	Designation	Size	P HC WKP25 S	P HC WKP35 S	P HC WSP45	P HC WMP35	P HC WXP45	M HC WSP45	M HC WMP35	K HC WKP25 S	K HC WKP35 S	K HC WXK25	N HC WNN25	S HC WSP45	S HC WMP35	H	HC WXP40
Outer insert	P4840P– . R–A57	1–4	☺	😐	☹			😐		😐	☹			😐			
	P4840P– . R–E57	1–4	☺	😐	☹			😐		😐	☹			😐			
	P4840P– . R–E67	1–4	☺	😐	☹			😐		😐	☹			😐			
	P4841P– . R–A57	1–4	☺	😐	☹			😐		😐	☹			😐			
	P4841P– . R–E57	1–4	☺	😐	☹			😐		😐	☹			😐			
Centre insert	P4841C– . R–A57	1–4		☹							☹						☹
	P4841C– . R–E57	1–4		☹							☹						☹
	P4840C– . R–E67	1–4		☹							☹						☹

HC = Coated carbide



Drill
B 4213
Xtra·tec® Insert Drill

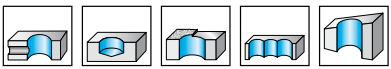


Parallel shank with flat in acc. with ISO 9767

- Diameter range 13,5–59 mm
- Right handed
- Drilling depth 3 x D_c

Designation	D_c mm	d_1 mm	d_4 mm	l_4 mm	l_5 mm	L_c mm	kg	No. of indexable inserts	Type
B4213.F32.29,5.Z1.088R-5	29,5	32	40	121	60	88,5	0,8	1/1	
B4213.F32.30.Z1.090R-5	30	32	40	122	60	90	1	1/1	
B4213.F32.31.Z1.093R-5	31	32	40	125	60	93	0,9	1/1	P484. P-5R P484. C-5R
B4213.F32.32.Z1.096R-5	32	32	40	128	60	96	0,9	1/1	
B4213.F32.33.Z1.099R-5	33	32	40	131	60	99	0,9	1/1	
B4213.F32.34.Z1.102R-5	34	32	40	134	60	102	1	1/1	
B4213.F32.35.Z1.105R-5	35	32	40	137	60	105	1	1/1	
B4213.F32.36.Z1.108R-6	36	32	40	140	60	108	1	1/1	
B4213.F40.37.Z1.111R-6	37	40	50	151	70	111	1,5	1/1	
B4213.F40.38.Z1.114R-6	38	40	50	154	70	114	1,6	1/1	P484. P-6R P484. C-6R
B4213.F40.39.Z1.117R-6	39	40	50	157	70	117	1,6	1/1	
B4213.F40.40.Z1.120R-6	40	40	50	160	70	120	1,7	1/1	
B4213.F40.41.Z1.123R-6	41	40	50	163	70	123	1,8	1/1	
B4213.F40.42.Z1.126R-6	42	40	50	166	70	126	1,8	1/1	
B4213.F40.43.Z1.129R-7	43	40	50	169	70	129	1,8	1/1	
B4213.F40.44.Z1.132R-7	44	40	50	172	70	132	1,9	1/1	
B4213.F40.45.Z1.135R-7	45	40	50	175	70	135	1,9	1/1	
B4213.F40.46.Z1.138R-7	46	40	50	178	70	138	2	1/1	P484. P-7R P484. C-7R
B4213.F40.47.Z1.141R-7	47	40	50	181	70	141	2,1	1/1	
B4213.F40.48.Z1.144R-7	48	40	50	184	70	144	2,2	1/1	
B4213.F40.49.Z1.147R-7	49	40	50	187	70	147	2,3	1/1	
B4213.F40.50.Z1.150R-7	50	40	50	190	70	150	2,3	1/1	
B4213.F40.51.Z1.153R-8	51	40	50	193	70	153	2,3	1/1	
B4213.F40.52.Z1.156R-8	52	40	50	196	70	156	2,4	1/1	
B4213.F40.53.Z1.159R-8	53	40	50	199	70	159	2,5	1/1	
B4213.F40.54.Z1.162R-8	54	40	50	202	70	162	2,6	1/1	P484. P-8R P484. C-8R
B4213.F40.55.Z1.165R-8	55	40	50	205	70	165	2,7	1/1	
B4213.F40.56.Z1.168R-8	56	40	50	208	70	168	2,8	1/1	
B4213.F40.57.Z1.171R-8	57	40	50	211	70	171	2,9	1/1	
B4213.F40.58.Z1.174R-8	58	40	50	214	70	174	3,1	1/1	
B4213.F40.59.Z1.177R-8	59	40	50	217	70	177	3,2	1/1	

Bodies, assembly parts and screwdrivers are included in the standard pack. Important: Where through bores are created by a rotating tool, a disc forms which is ejected. Please implement safety measures.



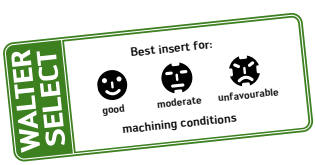
Assembly parts	D_c mm	29,5-35	36-42	43-59
	Clamping screw for insert Tightening torque	FS2080 (Torx 15 IP) 2,5 Nm	FS1453 (Torx 15 IP) 3,5 Nm	FS1495 (Torx 20 IP) 5,0 Nm

Accessories	D_c mm	29,5-42	43-59
	Torque screwdriver	FS2003	FS2003
	Interchangeable blade	FS2014 (Torx 15 IP)	FS2015 (Torx 20 IP)

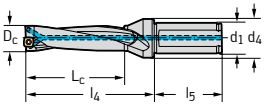
Indexable inserts

	Designation	Size	P HC					M HC		K HC				N HC		S HC		H	HC
			WKP25 S	WKP35 S	WSP45	WMP35	WXP45	WSP45	WMP35	WKP25 S	WKP35 S	WXK25	WNN25			WSP45	WMP35		WXP40
 Outer insert	P4840P– . R–A57	5–8	☺	😐	☹			😐		😐	☹					😐			
	P4840P– . R–E57	5–8	☺	😐	☹			😐		😐	☹					😐			
	P4840P– . R–E67	5–8	☺	😐	☹			😐		😐	☹					😐			
	P4841P– . R–A57	5–8	☺	😐	☹			😐		😐	☹					😐			
	P4841P– . R–E57	5–8	☺	😐	☹			😐		😐	☹					😐			
 Centre insert	P4841C– . R–A57	5–8		☹							☹								☹
	P4841C– . R–E57	5–8		☹							☹								☹
	P4840C– . R–E67	5–8		☹							☹								☹

HC = Coated carbide



Drill
B 4214
Xtra·tec® Insert Drill

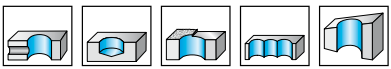


Parallel shank with flat in acc. with ISO 9768

- Diameter range 17–59 mm
- Right handed
- Drilling depth 4 x D_c

Designation	D_c mm	d_1 mm	d_4 mm	l_4 mm	l_5 mm	L_c mm	kg	No. of indexable inserts	Type
B4214.F25.17.Z1.068R-2	17	25	32	93	56	68	0,36	1/1	P484 . P-2R / P484 . C-2R
B4214.F25.18.Z1.072R-2	18	25	32	97	56	72	0,38	1/1	
B4214.F25.19.Z1.076R-2	19	25	32	101	56	76	0,39	1/1	
B4214.F25.20.Z1.080R-2	20	25	32	105	56	80	0,4	1/1	
B4214.F25.21.Z1.084R-3	21	25	32	109	56	84	0,5	1/1	P484 . P-3R / P484 . C-3R
B4214.F25.22.Z1.088R-3	22	25	32	113	56	88	0,5	1/1	
B4214.F25.23.Z1.092R-3	23	25	32	117	56	92	0,6	1/1	
B4214.F25.24.Z1.096R-3	24	25	32	121	56	96	0,5	1/1	
B4214.F25.25.Z1.100R-4	25	25	32	125	56	100	0,5	1/1	P484 . P-4R / P484 . C-4R
B4214.F32.26.Z1.104R-4	26	32	40	136	60	104	0,8	1/1	
B4214.F32.27.Z1.108R-4	27	32	40	140	60	108	0,8	1/1	
B4214.F32.28.Z1.112R-4	28	32	40	144	60	112	0,9	1/1	
B4214.F32.29.Z1.116R-4	29	32	40	148	60	116	0,9	1/1	

Bodies, assembly parts and screwdrivers are included in the standard pack. Important: Where through bores are created by a rotating tool, a disc forms which is ejected. Please implement safety measures.



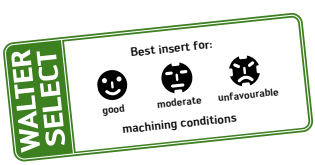
Assembly parts	D_c mm	17-20	21-24	25-29
	Clamping screw for insert Tightening torque	FS2111 (Torx 7 IP) 0,9 Nm	FS1454 (Torx 8 IP) 1,2 Nm	FS1457 (Torx 9 IP) 2,0 Nm

Accessories	D_c mm	17-20	21-24	25-29
	Torque screwdriver	FS2001	FS2001	FS2003
	Interchangeable blade	FS2011 (Torx 7 IP)	FS2012 (Torx 8 IP)	FS2013 (Torx 9 IP)

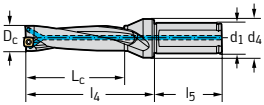
Indexable inserts

	Designation	Size	P HC WKP25 S	P HC WKP35 S	P HC WSP45	P HC WMP35	P HC WXP45	M HC WSP45	M HC WMP35	K HC WKP25 S	K HC WKP35 S	K HC WXK25	N HC WNN25	S HC WSP45	S HC WMP35	H	HC WXP40
 Outer insert	P4840P– . R–A57	1–4	☺	😐	☹			😐		😐	☹			😐			
	P4840P– . R–E57	1–4	☺	😐	☹			😐		😐	☹			😐			
	P4840P– . R–E67	1–4	☺	😐	☹			😐		😐	☹			😐			
	P4841P– . R–A57	1–4	☺	😐	☹			😐		😐	☹			😐			
	P4841P– . R–E57	1–4	☺	😐	☹			😐		😐	☹			😐			
 Centre insert	P4841C– . R–A57	1–4		☹							☹						☹
	P4841C– . R–E57	1–4		☹							☹						☹
	P4840C– . R–E67	1–4		☹							☹						☹

HC = Coated carbide



Drill
B 4214
Xtra·tec® Insert Drill

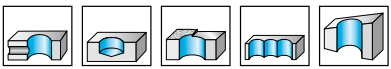


Parallel shank with flat in acc. with ISO 9768

– Diameter range 17–59 mm
– Right handed
– Drilling depth 4 x D_c

Designation	D_c mm	d_1 mm	d_4 mm	l_4 mm	l_5 mm	L_c mm	kg	No. of indexable inserts	Type
B4214.F32.30.Z1.120R-5	30	32	40	152	60	120	0,9	1/1	P484. P-5R P484. C-5R
B4214.F32.31.Z1.124R-5	31	32	40	156	60	124	1	1/1	
B4214.F32.32.Z1.128R-5	32	32	40	160	60	128	1	1/1	
B4214.F32.33.Z1.132R-5	33	32	40	164	60	132	1,1	1/1	
B4214.F32.34.Z1.136R-5	34	32	40	168	60	136	1,1	1/1	
B4214.F32.35.Z1.140R-5	35	32	40	172	60	140	1,2	1/1	
B4214.F32.36.Z1.144R-6	36	32	40	176	60	144	1,1	1/1	P484. P-6R P484. C-6R
B4214.F40.37.Z1.148R-6	37	40	50	188	70	148	1,7	1/1	
B4214.F40.38.Z1.152R-6	38	40	50	192	70	152	1,8	1/1	
B4214.F40.39.Z1.156R-6	39	40	50	196	70	156	1,8	1/1	
B4214.F40.40.Z1.160R-6	40	40	50	200	70	160	1,9	1/1	
B4214.F40.41.Z1.164R-6	41	40	50	204	70	164	2	1/1	
B4214.F40.42.Z1.168R-6	42	40	50	208	70	168	2,1	1/1	
B4214.F40.43.Z1.172R-7	43	40	50	212	70	172	2	1/1	P484. P-7R P484. C-7R
B4214.F40.44.Z1.176R-7	44	40	50	216	70	176	2,1	1/1	
B4214.F40.45.Z1.180R-7	45	40	50	220	70	180	2,2	1/1	
B4214.F40.46.Z1.184R-7	46	40	50	224	70	184	2,3	1/1	
B4214.F40.47.Z1.188R-7	47	40	50	228	70	188	2,4	1/1	
B4214.F40.48.Z1.192R-7	48	40	50	232	70	192	2,5	1/1	
B4214.F40.49.Z1.196R-7	49	40	50	236	70	196	2,7	1/1	
B4214.F40.50.Z1.200R-7	50	40	50	240	70	200	2,8	1/1	
B4214.F40.51.Z1.204R-8	51	40	50	244	70	204	2,8	1/1	P484. P-8R P484. C-8R
B4214.F40.52.Z1.208R-8	52	40	50	248	70	208	2,9	1/1	
B4214.F40.53.Z1.212R-8	53	40	50	252	70	212	3	1/1	
B4214.F40.54.Z1.216R-8	54	40	50	256	70	216	3,2	1/1	
B4214.F40.55.Z1.220R-8	55	40	50	260	70	220	3,3	1/1	
B4214.F40.56.Z1.224R-8	56	40	50	264	70	224	3,4	1/1	
B4214.F40.57.Z1.228R-8	57	40	50	268	70	228	3,6	1/1	
B4214.F40.58.Z1.232R-8	58	40	50	272	70	232	3,8	1/1	
B4214.F40.59.Z1.236R-8	59	40	50	276	70	236	3,9	1/1	

Bodies, assembly parts and screwdrivers are included in the standard pack. Important: Where through bores are created by a rotating tool, a disc forms which is ejected. Please implement safety measures.



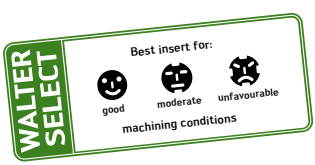
Assembly parts	D_c mm	30-35	36-42	43-59
	Clamping screw for insert Tightening torque	FS2080 (Torx 15 IP) 2,5 Nm	FS1453 (Torx 15 IP) 3,5 Nm	FS1495 (Torx 20 IP) 5,0 Nm

Accessories	D_c mm	30-42	43-59
	Torque screwdriver	FS2003	FS2003
	Interchangeable blade	FS2014 (Torx 15 IP)	FS2015 (Torx 20 IP)

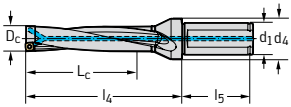
Indexable inserts

	Designation	Size	P HC					M HC		K HC				N HC		S HC			H	HC
			WKP25 S	WKP35 S	WSP45	WMP35	WXP45	WSP45	WMP35	WKP25 S	WKP35 S	WXK25		WNN25		WSP45	WMP35			WXP40
 Outer insert	P4840P– . R–A57	5–8	☺	😐	☹			😐		😐	☹					😐				
	P4840P– . R–E57	5–8	☺	😐	☹			😐		😐	☹					😐				
	P4840P– . R–E67	5–8	☺	😐	☹			😐		😐	☹					😐				
	P4841P– . R–A57	5–8	☺	😐	☹			😐		😐	☹					😐				
	P4841P– . R–E57	5–8	☺	😐	☹			😐		😐	☹					😐				
 Centre insert	P4841C– . R–A57	5–8		☹							☹									☹
	P4841C– . R–E57	5–8		☹							☹									☹
	P4840C– . R–E67	5–8		☹							☹									☹

HC = Coated carbide



Drill
B 4215
Xtra·tec® Insert Drill

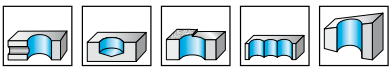


Parallel shank with flat in acc. with ISO 9768

- Diameter range 17–59 mm
- Right handed
- Drilling depth 5 x D_c

Designation	D_c mm	d_1 mm	d_4 mm	l_4 mm	l_5 mm	L_c mm	kg	No. of indexable inserts	Type
B4215.F25.17.Z1.085R-2	17	25	32	110	56	85	0,38	1/1	P484. P-2R / P484. C-2R
B4215.F25.18.Z1.090R-2	18	25	32	115	56	90	0,4	1/1	
B4215.F25.19.Z1.095R-2	19	25	32	120	56	95	0,42	1/1	
B4215.F25.20.Z1.100R-2	20	25	32	125	56	100	0,44	1/1	
B4215.F25.21.Z1.105R-3	21	25	32	130	56	105	0,5	1/1	P484. P-3R / P484. C-3R
B4215.F25.22.Z1.110R-3	22	25	32	135	56	110	0,49	1/1	
B4215.F25.23.Z1.115R-3	23	25	32	140	56	115	0,5	1/1	
B4215.F25.24.Z1.120R-3	24	25	32	145	56	120	0,6	1/1	
B4215.F25.25.Z1.125R-4	25	25	32	150	56	125	0,6	1/1	P484. P-4R / P484. C-4R
B4215.F32.26.Z1.130R-4	26	32	40	162	60	130	0,9	1/1	
B4215.F32.27.Z1.135R-4	27	32	40	167	60	135	0,9	1/1	
B4215.F32.28.Z1.140R-4	28	32	40	172	60	140	0,9	1/1	
B4215.F32.29.Z1.145R-4	29	32	40	177	60	145	1	1/1	

Bodies, assembly parts and screwdrivers are included in the standard pack. Important: Where through bores are created by a rotating tool, a disc forms which is ejected. Please implement safety measures.



Assembly parts

	D_c mm	17-20	21-24	25-29
	Clamping screw for insert Tightening torque	FS2111 (Torx 7 IP) 0,9 Nm	FS1454 (Torx 8 IP) 1,2 Nm	FS1457 (Torx 9 IP) 2,0 Nm

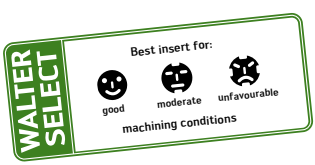
Accessories

	D_c mm	17-20	21-24	25-29
	Torque screwdriver	FS2001	FS2001	FS2003
	Interchangeable blade	FS2011 (Torx 7 IP)	FS2012 (Torx 8 IP)	FS2013 (Torx 9 IP)

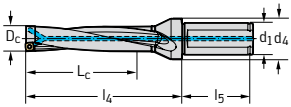
Indexable inserts

	Designation	Size	P HC					M HC		K HC				N HC		S HC		H	HC
			WKP25 S	WKP35 S	WSP45	WMP35	WXP45	WSP45	WMP35	WKP25 S	WKP35 S	WXK25	WNN25			WSP45	WMP35		WXP40
 Outer insert	P4840P– . R–A57	2–4	☺	😐	☹			😐		😐	☹					😐			
	P4840P– . R–E57	2–4	☺	😐	☹			😐		😐	☹					😐			
	P4840P– . R–E67	2–4	☺	😐	☹			😐		😐	☹					😐			
	P4841P– . R–A57	2–4	☺	😐	☹			😐		😐	☹					😐			
	P4841P– . R–E57	2–4	☺	😐	☹			😐		😐	☹					😐			
 Centre insert	P4841C– . R–A57	2–4		☹							☹								☹
	P4841C– . R–E57	2–4		☹							☹								☹
	P4840C– . R–E67	2–4		☹							☹								☹

HC = Coated carbide



Drill
B 4215
Xtra·tec® Insert Drill

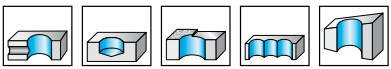


Parallel shank with flat in acc. with ISO 9768

- Diameter range 17–59 mm
- Right handed
- Drilling depth 5 x D_c

Designation	D_c mm	d_1 mm	d_4 mm	l_4 mm	l_5 mm	L_c mm	kg	No. of indexable inserts	Type
B4215.F32.30.Z1.150R-5	30	32	40	182	60	150	1	1/1	
B4215.F32.31.Z1.155R-5	31	32	40	187	60	155	1,1	1/1	
B4215.F32.32.Z1.160R-5	32	32	40	192	60	160	1,1	1/1	P484. P-5R
B4215.F32.33.Z1.165R-5	33	32	40	197	60	165	1,2	1/1	
B4215.F32.34.Z1.170R-5	34	32	40	202	60	170	1,3	1/1	P484. C-5R
B4215.F32.35.Z1.175R-5	35	32	40	207	60	175	1,3	1/1	
B4215.F32.36.Z1.180R-6	36	32	40	212	60	180	1,3	1/1	
B4215.F40.37.Z1.185R-6	37	40	50	225	70	185	1,9	1/1	
B4215.F40.38.Z1.190R-6	38	40	50	230	70	190	1,9	1/1	
B4215.F40.39.Z1.195R-6	39	40	50	235	70	195	2	1/1	P484. P-6R
B4215.F40.40.Z1.200R-6	40	40	50	240	70	200	2,1	1/1	
B4215.F40.41.Z1.205R-6	41	40	50	245	70	205	2,2	1/1	P484. C-6R
B4215.F40.42.Z1.210R-6	42	40	50	250	70	210	2,3	1/1	
B4215.F40.43.Z1.215R-7	43	40	50	255	70	215	2,3	1/1	
B4215.F40.44.Z1.220R-7	44	40	50	260	70	220	2,4	1/1	
B4215.F40.45.Z1.225R-7	45	40	50	265	70	225	2,6	1/1	
B4215.F40.46.Z1.230R-7	46	40	50	270	70	230	2,7	1/1	P484. P-7R
B4215.F40.47.Z1.235R-7	47	40	50	275	70	235	2,8	1/1	
B4215.F40.48.Z1.240R-7	48	40	50	280	70	240	2,9	1/1	P484. C-7R
B4215.F40.49.Z1.245R-7	49	40	50	285	70	245	3	1/1	
B4215.F40.50.Z1.250R-7	50	40	50	290	70	250	3,2	1/1	
B4215.F40.51.Z1.255R-8	51	40	50	295	70	255	3,2	1/1	
B4215.F40.52.Z1.260R-8	52	40	50	300	70	260	3,4	1/1	
B4215.F40.53.Z1.265R-8	53	40	50	305	70	265	3,5	1/1	
B4215.F40.54.Z1.270R-8	54	40	50	310	70	270	3,7	1/1	P484. P-8R
B4215.F40.55.Z1.275R-8	55	40	50	315	70	275	3,8	1/1	
B4215.F40.56.Z1.280R-8	56	40	50	320	70	280	4	1/1	P484. C-8R
B4215.F40.57.Z1.285R-8	57	40	50	325	70	285	4,2	1/1	
B4215.F40.58.Z1.290R-8	58	40	50	330	70	290	4,4	1/1	
B4215.F40.59.Z1.295R-8	59	40	50	335	70	295	4,6	1/1	

Bodies, assembly parts and screwdrivers are included in the standard pack. Important: Where through bores are created by a rotating tool, a disc forms which is ejected. Please implement safety measures.



Assembly parts

	D_c mm	30-35	36-42	43-59
	Clamping screw for insert Tightening torque	FS2080 (Torx 15 IP) 2,5 Nm	FS1453 (Torx 15 IP) 3,5 Nm	FS1495 (Torx 20 IP) 5,0 Nm

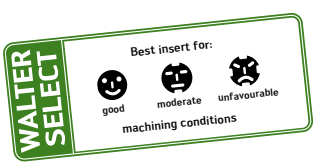
Accessories

	D_c mm	30-42	43-59
	Torque screwdriver	FS2003	FS2003
	Interchangeable blade	FS2014 (Torx 15 IP)	FS2015 (Torx 20 IP)

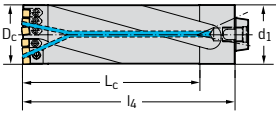
Indexable inserts

	Designation	Size	P HC					M HC		K HC				N HC		S HC		H	HC
			WKP25 S	WKP35 S	WSP45	WMP35	WXP45	WSP45	WMP35	WKP25 S	WKP35 S	WXK25	WNN25			WSP45	WMP35		WXP40
 Outer insert	P4840P– . R–A57	5–8	☺	😐	☹			😐		😐	☹					😐			
	P4840P– . R–E57	5–8	☺	😐	☹			😐		😐	☹					😐			
	P4840P– . R–E67	5–8	☺	😐	☹			😐		😐	☹					😐			
	P4841P– . R–A57	5–8	☺	😐	☹			😐		😐	☹					😐			
	P4841P– . R–E57	5–8	☺	😐	☹			😐		😐	☹					😐			
 Centre insert	P4841C– . R–A57	5–8		☹							☹								☹
	P4841C– . R–E57	5–8		☹							☹								☹
	P4840C– . R–E67	5–8		☹							☹								☹

HC = Coated carbide



Drill
B 4213.N
Xtra·tec® Insert Drill



Modular adaptor

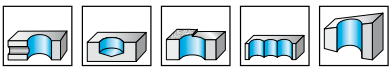
- Diameter range 65–80 mm
- Right handed
- Drilling depth 3 x D_c

Designation	D_c mm	d_1 mm	l_4 mm	L_c mm	Number of external cartridges	Number of internal cartridges	kg	No. of indexable inserts	Type
B4213.N8.065.Z1.195R-5	65	NCT 80	245	195	1xFR738 +FR741	1xFR737C-5	4,1	3/1	P484 . P-5R P484 . C-5R
B4213.N8.068.Z1.204R-6	68	NCT 80	254	204	1xFR744 +FR745	1xFR743C-6	4,5	3/1	
B4213.N8.070.Z1.210R-6	70	NCT 80	260	210	1xFR744 +FR746	1xFR743C-P	4,7	3/1	P484 . P-6R P484 . C-6R
B4213.N8.078.Z1.234R-6	78	NCT 80	284	234	1XFR744 +FR748	1xFR743C-6	6	3/1	
B4213.N8.080.Z1.240R-5	80	NCT 80	290	240	1xFR738 +FR739	1xFR737C-5	6,2	1/1	P484 . P-5R P484 . C-5R

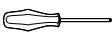
Bodies, assembly parts and screwdrivers are included in the standard pack. Important: Where through bores are created by a rotating tool, a disc forms which is ejected. Please implement safety measures.

For other diameters between 59,5 mm and 120 mm, appropriate tool designs and additional cartridges are available. If necessary, please contact your Walter consultant.

D_c mm	No. of cartridges											No. of inserts			
	FR737C–5	FR738P–5	FR739P–5	FR740P–5	FR741P–5	FR743C–6	FR744P–6	FR745P–6	FR746P–6	FR747P–6	FR748P–6	P484 . P–Gr.5	P484 . C–Gr.5	P484 . P–Gr.6	P484 . C–Gr.6
59,0–62,0	1	1		1								3	1		
62,1–65,0	1	1			1							3	1		
65,1–68,4						1	1	1						3	1
68,5–72,8						1	1		1					3	1
72,9–76,6						1	1			1				3	1
76,7–79,1						1	1				1			3	1
79,2–82,5	1	3	1									5	1		
82,6–85,1	1	3		1								5	1		
85,2–87,0	1	3			1							5	1		
87,1–90,2	1	3	1									5	1		
90,3–92,3	1	3		1								5	1		
92,4–95,8	1	3			1							5	1		
95,9–99,2						1	3	1						5	1
99,3–102,7						1	3		1					5	1
102,8–105,4						1	3			1				5	1
105,5–108,8						1	3		1					5	1
108,9–114,2						1	3			1				5	1
114,3–120,0						1	3				1			5	1



Assembly parts	D_c mm	65	68	70	78	80
	Internal cartridge	FR737C-5	FR743C-6	FR743C-6	FR743C-6	FR737C-5
	External cartridge	FR738P-5	FR745P-6	FR746P-6	FR744P-6	FR738P-5
	Clamping screw for insert Tightening torque	FS1453 (Torx 15 IP) 3,5 Nm	FS1453 (Torx 15 IP) 3,5 Nm	FS1453 (Torx 15 IP) 3,5 Nm	FS1453 (Torx 15 IP) 3,5 Nm	FS1453 (Torx 15 IP) 3,5 Nm
	Adjusting screw, radial	FS334	FS334	FS334	FS334	FS334
	Clamping screw for cartridge Tightening torque	FS966 (SW 5) 8,0 Nm	FS966 (SW 5) 8,0 Nm	FS966 (SW 5) 8,0 Nm	FS966 (SW 5) 8,0 Nm	FS966 (SW 5) 8,0 Nm

Accessories	D_c mm	65-68	70	75-80
	Screwdriver	FS1485 (Torx 15IP)	FS1485 (Torx 15IP)	FS1485 (Torx 15IP)
	Torque screwdriver	FS2003	FS2003	FS2003
	Interchangeable blade	FS2014 (Torx 15 IP)	FS2014 (Torx 15 IP)	FS2014 (Torx 15 IP)
	Key ISO 2936	ISO2936-4 (SW 4)	ISO2936-5 (SW 5)	ISO2936-4 (SW 4)

Indexable inserts

	Designation	Size	P HC WKP25 S	P HC WKP35 S	P HC WSP45	P HC WMP35	P HC WXP45	M HC WSP45	M HC WMP35	K HC WKP25 S	K HC WKP35 S	K HC WXK25	N HC WNN25		S HC WSP45	S HC WMP35	H	HC WXP40
 Outer insert	P4840P-. .R-A57	5–8	☻	☻	☹			☻		☻	☹				☻			
	P4840P-. .R-E57	5–8	☻	☻	☹			☻		☻	☹				☻			
	P4840P-. .R-E67	5–8	☻	☻	☹			☻		☻	☹				☻			
	P4841P-. .R-A57	5–8	☻	☻	☹			☻		☻	☹				☻			
	P4841P-. .R-E57	5–8	☻	☻	☹			☻		☻	☹				☻			
 Centre insert	P4841C-. .R-A57	5–8		☹							☹							☹
	P4841C-. .R-E57	5–8		☹							☹							☹
	P4840C-. .R-E67	5–8		☹							☹							☹

HC = Coated carbide

Walter Select Optimum indexable insert for the following machining conditions: ☻ = good ☻ = moderate ☻ = unfavourable

Cutting data for drilling with Xtra·tec® Insert Drill D_C 13,5–59 mm

= Cutting data for wet machining

= Dry machining is possible

Material group	Structure of main material groups and identification letters			
P	Unalloyed steel	C ≤ 0,25 %	annealed	
		C > 0,25 ... ≤ 0,55 %	annealed	
		C > 0,25 ... ≤ 0,55 %	heat treated	
		C > 0,55 %	annealed	
		C > 0,55 %	heat treated	
		Free cutting steel (short-chipping)	annealed	
	Low-alloy steel	annealed		
		heat treated		
		heat treated		
		heat treated		
	High-alloy steel and high-alloy tool steel	annealed		
		hardened and tempered		
		hardened and tempered		
	Stainless steel	ferritic/martensitic, annealed		
		martensitic, heat treated		
M	Stainless steel	austenitic, quench hardened		
		austenitic, precipitation hardened (PH)		
		austenitic/ferritic, duplex		
K	Malleable cast iron	ferritic		
		perlitic		
	Grey cast iron	low tensile strength		
		high tensile strength/austenitic		
	Cast iron with spheroidal graphite	ferritic		
		perlitic		
	GGV (CGI)			
N	Copper and copper alloys (bronze/brass)	unalloyed, electrolytic copper		
		brass, bronze, red brass		
		Cu-alloys, short-chipping		
		high-strength, Ampco		
S	Tungsten alloys			
	Molybdenum alloys			

Footnotes to tables on page 46 to 53:

The machining group assignments can be found in the Walter general catalogue 2012 from page H 8 onwards

●● Recommended application (the specified cutting data are regarded as starting values for the recommended application)

● Possible application; limited to 2 x D_c drilling depth; MQL (minimum quantity lubrication) or compressed air is recommended

Brinell hardness HB	Tensile strength R_m N/mm²	Machining group [1]			Insert geometry Starting values for feed f [mm/rev] A 57 Size -1 D_c [mm] 13,5 – 16,4	Size -1 D_c [mm] 16,5 – 20,4	Size -1 D_c [mm] 20,5 – 24,4	Size -1 D_c [mm] 24,5 – 29,4	Size -1 D_c [mm] 29,5 – 42,4	Size -1 D_c [mm] 42,5 – 59,4
125	428	P1	●●		0,05	0,06	0,06	0,09	0,12	0,13
190	639	P2	●●		0,07	0,09	0,10	0,13	0,18	0,19
210	708	P3	●●		0,07	0,09	0,10	0,13	0,18	0,19
190	639	P4	●●		0,07	0,09	0,10	0,13	0,18	0,19,
300	1013	P5	●●		0,07	0,09	0,10	0,13	0,18	0,19
220	745	P6	●●	●	0,07	0,09	0,10	0,13	0,18	0,19,
175	591	P7	●●		0,08	0,10	0,12	0,15	0,20	0,21
300	1013	P8	●●		0,07	0,09	0,10	0,13	0,15	0,16
380	1282	P9	●●		0,07	0,09	0,10	0,13	0,15	0,16
430	1477	P10	●●		0,05	0,06	0,06	0,09	0,12	0,13
200	675	P11	●●		0,08	0,10	0,12	0,15	0,18	0,19
300	1013	P12	●●		0,07	0,09	0,10	0,13	0,15	0,16
400	1361	P13	●●		0,06	0,08	0,09	0,12	0,14	0,15
200	675	P14	●●		0,07	0,09	0,10	0,13	0,15	0,16
330	1114	P15	●●		0,06	0,08	0,09	0,12	0,14	0,15
200	675	M1	●●		0,06	0,07	0,08	0,10	0,13	0,14
300	1013	M2	●●		0,06	0,07	0,08	0,10	0,13	0,14
230	778	M3	●●		0,06	0,07	0,08	0,10	0,13	0,14
200	675	K1	●●	●	0,09	0,12	0,14	0,17	0,22	0,23
260	867	K2	●●	●	0,07	0,09	0,11	0,14	0,19	0,20
180	602	K3	●●	●	0,10	0,13	0,15	0,18	0,23	0,24
245	825	K4	●●	●	0,08	0,10	0,12	0,15	0,20	0,21
155	518	K5	●●	●	0,10	0,13	0,15	0,18	0,23	0,24
265	885	K6	●●		0,08	0,10	0,12	0,18	0,23	0,24
200	675	K7	●●	●	0,09	0,12	0,14	0,17	0,22	0,23
100	343	N7								
90	314	N8								
110	382	N9								
300	1013	N10	●●	●	0,06	0,07	0,08	0,10	0,13	0,14
300	1013	S9	●●		0,05	0,06	0,06	0,09	0,11	0,12
300	1013	S10	●●		0,05	0,06	0,06	0,09	0,11	0,12

Footnotes to tables on page 46 to 53:

When using drills > 3 x D the following reductions are recommended:
> 3 x D: Cutting speed v_c –20 %, feed f –30 % when spot drilling, feed f –50 % when spot drilling on sloping surfaces
> 4 x D: cutting speed v_c –30 %, feed f –40 % when spot drilling
HC = Coated carbide

Cutting data for drilling with Xtra·tec® Insert Drill D_C 13,5–59 mm

= Cutting data for wet machining

= Dry machining is possible

Material group	Structure of main material groups and identification letters			
P	Unalloyed steel	C ≤ 0,25 %	annealed	
		C > 0,25 ... ≤ 0,55 %	annealed	
		C > 0,25 ... ≤ 0,55 %	heat treated	
		C > 0,55 %	annealed	
		C > 0,55 %	heat treated	
		Free cutting steel (short-chipping)	annealed	
	Low-alloy steel	annealed		
		heat treated		
		heat treated		
		heat treated		
	High-alloy steel and high-alloy tool steel	annealed		
		hardened and tempered		
		hardened and tempered		
	Stainless steel	ferritic/martensitic, annealed		
		martensitic, heat treated		
M	Stainless steel	austenitic, quench hardened		
		austenitic, precipitation hardened (PH)		
		austenitic/ferritic, duplex		
K	Malleable cast iron	ferritic		
		perlitic		
	Grey cast iron	low tensile strength		
		high tensile strength/austenitic		
	Cast iron with spheroidal graphite	ferritic		
		perlitic		
	GGV (CGI)			
N	Aluminium wrought alloys	not precipitation hardenable		
		precipitation hardenable, precipitation hardened		
	Cast aluminium alloys	≤ 12 % Si, not precipitation hardenable		
		≤ 12 % Si, precipitation hardenable, precipitation hardened		
		> 12 % Si, not precipitation hardenable		
	Magnesium alloys			
	Copper and copper alloys (bronze/brass)	unalloyed, electrolytic copper		
		brass, bronze, red brass		
		Cu-alloys, short-chipping		
		high-strength, Ampco		
S	Heat-resistant alloys	Fe-based	annealed	
			precipitation hardened	
		Ni or Co base	annealed	
			precipitation hardened	
			cast	
	Titanium alloys	pure titanium		
		α and β alloys, precipitation hardened		
		β alloys		
	Tungsten alloys			
	Molybdenum alloys			

	Brinell hardness HB	Tensile strength R_m N/mm²	Machining group [1]			Insert geometry					
						Starting values for feed f [mm/rev]					
						E 57					
						Size -1 D_c [mm] 13,5 – 16,4	Size -2 D_c [mm] 16,5 – 20,4	Size -3 D_c [mm] 20,5 – 24,4	Size -4 D_c [mm] 24,5 – 29,4	Size -5, size -6 D_c [mm] 29,5 – 42,4	Size -7, size -8 D_c [mm] 42,5 – 59,4
	125	428	P1	●●		0,05	0,06	0,06	0,09	0,12	0,13
	190	639	P2	●●		0,06	0,07	0,08	0,11	0,17	0,18
	210	708	P3	●●		0,06	0,07	0,08	0,11	0,17	0,18
	190	639	P4	●●		0,06	0,07	0,08	0,11	0,17	0,18
	300	1013	P5	●●		0,06	0,07	0,08	0,11	0,17	0,18
	220	745	P6	●●	●	0,06	0,07	0,08	0,11	0,17	0,18
	175	591	P7	●●		0,06	0,08	0,10	0,13	0,19	0,20
	300	1013	P8	●●		0,06	0,07	0,08	0,11	0,14	0,15
	380	1282	P9	●●		0,06	0,07	0,08	0,11	0,14	0,15
	430	1477	P10	●●		0,05	0,06	0,06	0,09	0,11	0,12
	200	675	P11	●●		0,06	0,08	0,10	0,13	0,17	0,18
	300	1013	P12	●●		0,06	0,07	0,08	0,11	0,14	0,15
	400	1361	P13	●●		0,05	0,06	0,07	0,10	0,13	0,14
	200	675	P14	●●		0,06	0,07	0,08	0,11	0,14	0,15
	330	1114	P15	●●		0,05	0,06	0,07	0,10	0,13	0,14
	200	675	M1	●●		0,06	0,07	0,08	0,10	0,13	0,14
	300	1013	M2	●●		0,06	0,07	0,08	0,10	0,13	0,14
	230	778	M3	●●		0,06	0,07	0,08	0,10	0,13	0,14
	200	675	K1	●●	●	0,07	0,09	0,11	0,14	0,21	0,22
	260	867	K2	●●	●	0,05	0,07	0,08	0,11	0,18	0,19
	180	602	K3	●●	●	0,08	0,10	0,12	0,15	0,22	0,23
	245	825	K4	●●	●	0,06	0,08	0,09	0,12	0,19	0,20
	155	518	K5	●●	●	0,08	0,10	0,12	0,15	0,22	0,23
	265	885	K6	●●		0,06	0,08	0,09	0,12	0,22	0,23
	200	675	K7	●●	●	0,07	0,09	0,11	0,14	0,21	0,22
	30	–	N1								
	100	343	N2	●●		0,07	0,09	0,10	0,12	0,17	0,18
	75	260	N3	●●		0,08	0,10	0,12	0,15	0,17	0,18
	90	314	N4	●●		0,08	0,10	0,12	0,15	0,17	0,18
	130	447	N5	●●	●	0,08	0,10	0,12	0,15	0,17	0,18
	70	250	N6	●●		0,08	0,10	0,12	0,15	0,17	0,18
	100	343	N7								
	90	314	N8	●●		0,10	0,12	0,14	0,17	0,22	0,23
	110	382	N9	●●	●	0,10	0,12	0,14	0,17	0,22	0,23
	300	1013	N10	●●	●	0,06	0,07	0,08	0,10	0,13	0,14
	200	675	S1	●●		0,05	0,06	0,07	0,10	0,13	0,14
	280	943	S2	●●		0,05	0,06	0,06	0,09	0,11	0,12
	250	839	S3	●●		0,05	0,06	0,07	0,10	0,12	0,13
	350	1177	S4	●●		0,05	0,06	0,06	0,09	0,11	0,12
	320	1076	S5	●●		0,05	0,06	0,06	0,09	0,11	0,12
	200	675	S6								
	375	1262	S7	●●		0,05	0,06	0,07	0,10	0,12	0,13
	410	1396	S8	●●		0,05	0,06	0,06	0,09	0,11	0,12
	300	1013	S9	●●		0,05	0,06	0,06	0,09	0,11	0,12
	300	1013	S10	●●		0,05	0,06	0,06	0,09	0,11	0,12

Cutting data for drilling with Xtra·tec® Insert Drill D_C 13,5–59 mm

= Cutting data for wet machining

= Dry machining is possible

Material group	Structure of main material groups and identification letters		
P	Unalloyed steel	C ≤ 0,25 %	annealed
		C > 0,25 ... ≤ 0,55 %	annealed
		C > 0,25 ... ≤ 0,55 %	heat treated
		C > 0,55 %	annealed
		C > 0,55 %	heat treated
		Free cutting steel (short-chipping)	annealed
	Low-alloy steel	annealed	
		heat treated	
		heat treated	
		heat treated	
	High-alloy steel and high-alloy tool steel	annealed	
		hardened and tempered	
		hardened and tempered	
	Stainless steel	ferritic/martensitic, annealed	
		martensitic, heat treated	
M	Stainless steel	austenitic, quench hardened	
		austenitic, precipitation hardened (PH)	
		austenitic/ferritic, duplex	
K	Malleable cast iron	ferritic	
		perlitic	
	Grey cast iron	low tensile strength	
		high tensile strength/austenitic	
	Cast iron with spheroidal graphite	ferritic	
		perlitic	
	GGV (CGI)		
N	Aluminium wrought alloys	not precipitation hardenable	
		precipitation hardenable, precipitation hardened	
	Cast aluminium alloys	≤ 12 % Si, not precipitation hardenable	
		≤ 12 % Si, precipitation hardenable, precipitation hardened	
		> 12 % Si, not precipitation hardenable	
	Magnesium alloys		
	Copper and copper alloys (bronze/brass)	unalloyed, electrolytic copper	
		brass, bronze, red brass	
		Cu-alloys, short-chipping	
		high-strength, Ampco	
S	Heat-resistant alloys	Fe-based	annealed
			precipitation hardened
		Ni or Co base	annealed
			precipitation hardened
			cast
	titanium alloys	pure titanium	
		α and β alloys, precipitation hardened	
		β alloys	
	Tungsten alloys		
	Molybdenum alloys		

Brinell hardness HB	Tensile strength R_m N/mm²	Machining group [1]			Insert geometry Starting values for feed f [mm/rev] E 67 Size -1 D_c [mm] 13,5 – 16,4	Size -2 D_c [mm] 16,5 – 20,4	Size -3 D_c [mm] 20,5 – 24,4	Size -4 D_c [mm] 24,5 – 29,4	Size -5, size -6 D_c [mm] 29,5 – 42,4	Size -7, size -8 D_c [mm] 42,5 – 59,4
125	428	P1	●●		0,05	0,06	0,06	0,09	0,12	0,13
190	639	P2	●●		0,06	0,07	0,08	0,11	0,17	0,18
210	708	P3	●●							
190	639	P4	●●							
300	1013	P5	●●							
220	745	P6	●●	●						
175	591	P7	●●		0,06	0,08	0,10	0,14	0,20	0,21
300	1013	P8	●●							
380	1282	P9	●●							
430	1477	P10	●●							
200	675	P11	●●		0,06	0,08	0,10	0,12	0,16	0,17
300	1013	P12	●●							
400	1361	P13	●●							
200	675	P14	●●		0,06	0,07	0,08	0,11	0,14	0,15
330	1114	P15	●●		0,05	0,06	0,07	0,10	0,13	0,15
200	675	M1	●●		0,06	0,07	0,09	0,12	0,14	0,15
300	1013	M2	●●		0,06	0,07	0,09	0,12	0,14	0,15
230	778	M3	●●		0,06	0,07	0,09	0,12	0,14	0,15
200	675	K1	●●	●	0,07	0,09	0,11	0,14	0,21	0,22
260	867	K2	●●	●	0,05	0,07	0,09			
180	602	K3	●●	●	0,08	0,10	0,12	0,15	0,22	0,23
245	825	K4	●●	●						
155	518	K5	●●	●	0,08	0,10	0,12	0,15	0,22	0,23
265	885	K6	●●		0,06	0,08				
200	675	K7	●●	●	0,07	0,09	0,11	0,14	0,21	0,22
30	–	N1								
100	343	N2	●●		0,07	0,09	0,11	0,12	0,17	0,18
75	260	N3	●●		0,08	0,10	0,12	0,15	0,17	0,18
90	314	N4	●●		0,08	0,10	0,12	0,15	0,17	0,18
130	447	N5	●●	●	0,08	0,10	0,12	0,15	0,17	0,18
70	250	N6	●●		0,08	0,10	0,12	0,15	0,17	0,18
100	343	N7								
90	314	N8	●●		0,10	0,12	0,14	0,17	0,22	0,23
110	382	N9	●●	●	0,10	0,12	0,14	0,17	0,22	0,23
300	1013	N10	●●	●	0,06	0,07	0,09	0,12	0,14	0,15
200	675	S1	●●		0,05	0,06	0,07	0,10	0,13	0,14
280	943	S2	●●		0,05	0,06	0,06	0,09	0,11	0,12
250	839	S3	●●		0,05	0,06	0,07	0,10	0,12	0,13
350	1177	S4	●●		0,05	0,06	0,06	0,09	0,11	0,12
320	1076	S5	●●		0,05	0,06	0,06	0,09	0,11	0,12
200	675	S6								
375	1262	S7	●●		0,05	0,06	0,07	0,10	0,12	0,13
410	1396	S8	●●		0,05	0,06	0,06	0,09	0,11	0,12
300	1013	S9	●●		0,05	0,06	0,06	0,09	0,11	0,12
300	1013	S10	●●		0,05	0,06	0,06	0,09	0,11	0,12

Cutting data for drilling with Xtra·tec® Insert Drill D_C 13,5–59 mm

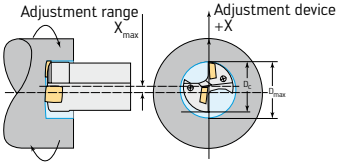
= Cutting data for wet machining

= Dry machining is possible

Material group	Structure of main material groups and identification letters		
P	Unalloyed steel	C ≤ 0,25 %	annealed
		C > 0,25 ... ≤ 0,55 %	annealed
		C > 0,25 ... ≤ 0,55 %	heat treated
		C > 0,55 %	annealed
		C > 0,55 %	heat treated
		Free cutting steel (short-chipping)	annealed
	Low-alloy steel	annealed	
		heat treated	
		heat treated	
		heat treated	
	High-alloy steel and high-alloy tool steel	annealed	
		hardened and tempered	
		hardened and tempered	
	Stainless steel	ferritic/martensitic, annealed	
		martensitic, heat treated	
M	Stainless steel	austenitic, quench hardened	
		austenitic, precipitation hardened (PH)	
		austenitic/ferritic, duplex	
K	Malleable cast iron	ferritic	
		perlitic	
	Grey cast iron	low tensile strength	
		high tensile strength/austenitic	
	Cast iron with spheroidal graphite	ferritic	
		perlitic	
	GGV (CGI)		
N	Aluminium wrought alloys	not precipitation hardenable	
		precipitation hardenable, precipitation hardened	
	Cast aluminium alloys	≤ 12 % Si, not precipitation hardenable	
		≤ 12 % Si, precipitation hardenable, precipitation hardened	
		> 12 % Si, not precipitation hardenable	
	Magnesium alloys		
	Copper and copper alloys (bronze/brass)	unalloyed, electrolytic copper	
		brass, bronze, red brass	
		Cu-alloys, short-chipping	
		high-strength, Ampco	
S	Heat-resistant alloys	Fe-based	annealed
			precipitation hardened
		Ni or Co base	annealed
			precipitation hardened
			cast
	titanium alloys	pure titanium	
		α and β alloys, precipitation hardened	
		β alloys	
	Tungsten alloys		
	Molybdenum alloys		

Brinell hardness HB	Tensile strength R_m N/mm²	Machining group [1]			Cutting material grade, outer insert [P484.P..]								
					Starting values for cutting speed v_c [m/min]								
					HC								
					WKP 25S f [mm/rev]			WKP 35S f [mm/rev]			WSP 45 f [mm/rev]		
					0,06	0,10	0,16	0,06	0,10	0,16	0,06	0,10	0,16
125	428	P1	●●		350	320		300	270		250	220	
190	639	P2	●●		260	240	220	220	200	180	170	160	150
210	708	P3	●●		240	220	200	200	180	150	150	140	130
190	639	P4	●●		220	200	180	180	150	140	140	130	120
300	1013	P5	●●		190	170	150	150	130	120	130	120	110
220	745	P6	●●	●	220	200	180	180	150	140	140	130	120
175	591	P7	●●		260	240	220	220	200	180	170	160	160
300	1013	P8	●●		230	210	190	190	170	140	140	130	120
380	1282	P9	●●		210	190	170	180	160	130	140	120	110
430	1477	P10	●●		190	170	160	170	140	130	140	120	110
200	675	P11	●●		220	200	180	200	170	150	140	130	120
300	1013	P12	●●		200	170	150	180	140	130	130	120	110
400	1361	P13	●●		190	160	140	170	130	120	120	110	100
200	675	P14	●●					190	170	150	140	130	120
330	1114	P15	●●					150	130	120	120	110	100
200	675	M1	●●					220	200	180	180	170	150
300	1013	M2	●●					150	130	110	130	110	100
230	778	M3	●●					120	100	80	100	80	70
200	675	K1	●●	●	210	190	170	190	180	160	170	140	120
260	867	K2	●●	●	190	140	120	130	120	110	130	120	110
180	602	K3	●●	●	220	200	180	200	190	170	180	160	130
245	825	K4	●●	●	180	150	130	150	130	110	150	130	110
155	518	K5	●●	●	150	140	130	140	120	110	150	130	120
265	885	K6	●●		140	130	120	120	110	100	120	110	110
200	675	K7	●●	●	180	150	130	150	130	110	150	130	110
30	–	N1											
100	343	N2	●●								450	450	450
75	260	N3	●●								300	300	300
90	314	N4	●●								250	250	250
130	447	N5	●●	●							200	200	200
70	250	N6	●●								300	300	300
100	343	N7											
90	314	N8	●●								300	250	200
110	382	N9	●●	●							350	300	250
300	1013	N10	●●	●				150	130	110	130	110	100
200	675	S1	●●		100	100		100	100		90	90	
280	943	S2	●●		80	80		80	80		70	70	
250	839	S3	●●		60	60		60	60		50	50	
350	1177	S4	●●		50	50		50	50		40	40	
320	1076	S5	●●		50	50		50	50		40	40	
200	675	S6											
375	1262	S7	●●					50	50		50	45	
410	1396	S8	●●					50	50		40	40	
300	1013	S9	●●		70	60							
300	1013	S10	●●		70	60							

Drilling with X offset
Xtra·tec® Insert Drill B421x



Drilling with X offset:
Drill: standing
Workpiece: rotating

$$D = D_c + 2 \cdot X$$

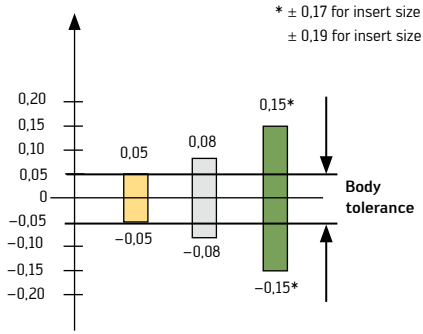
Indexable insert size	Range 1			Range 2	
	D_c mm	Delta x mm	D_{max} mm	Delta x_{max} mm	D_{max} mm
	13,5	0,5	14,5	0,7	14,9
	14	0,35	14,7	0,6	15,2
	14,5	0,3	15,1	0,5	15,5
1	15	0,2	15,4	0,45	15,9
	15,5	0,15	15,8	0,35	16,2
	16	0,05	16,1	0,3	16,6
	16,4	0	–	0,2	16,8
	16,5	0,6	17,7	0,9	18,3
	17	0,5	18	0,75	18,5
	17,5	0,35	18,2	0,6	18,7
	18	0,3	18,6	0,55	19,1
2	18,5	0,2	18,9	0,45	19,4
	19	0,15	19,3	0,4	19,8
	19,5	0,07	19,64	0,3	20,1
	20	0	20	0,25	20,5
	20,4*	0	–	0,15	20,7
	20,5	0,35	21,2	0,7	21,9
	21	0,3	21,6	0,6	22,2
	21,5	0,17	21,84	0,45	22,4
	22	0,15	22,3	0,45	22,9
3	22,5	0,02	22,54	0,3	23,1
	23	0	–	0,3	23,6
	23,5*	0	–	0,18	23,86
	24*	0	–	0,15	24,3
	24,4*	0	–	0	–
	24,5	0,5	25,5	0,85	26,2
	25	0,35	25,7	0,75	26,5
	25,5	0,25	26	0,6	26,7
	26	0,15	26,3	0,55	27,1
	26,5	0,05	26,6	0,4	27,3
4	27	0	–	0,4	27,8
	27,5	0	–	0,25	28
	28*	0	–	0,25	28,5
	28,5*	0	–	0,12	28,74
	29*	0	–	0,1	29,2
	29,4*	0	–	0	–

Indexable insert size		Range 1		Range 2	
	D_c mm	Delta x mm	D_{max} mm	Delta x_{max} mm	D_{max} mm
5	29,5	0,7	30,9	1,1	31,7
	30	0,6	31,2	1	32
	31	0,45	31,9	0,8	32,6
	32	0,3	32,6	0,7	33,4
	33	0,15	33,3	0,5	34
	34	0	–	0,4	34,8
	35*	0	–	0,3	35,6
	35,4*	0	–	0,2	35,8
6	35,5	0,8	37,1	1,4	38,3
	36	0,7	37,4	1,25	38,5
	37	0,55	38,1	1,1	39,2
	38	0,4	38,8	0,95	39,9
	39	0,25	39,5	0,8	40,6
	40	0,1	40,2	0,65	41,3
	41	0	–	0,55	42,1
	42	0	–	0,4	42,8
	42,4	0	–	0,3	43
7	42,5	0,95	44,4	1,65	45,8
	43	0,85	44,7	1,5	46
	44	0,7	45,4	1,35	46,7
	45	0,55	46,1	1,2	47,4
	46	0,4	46,8	1,1	48,2
	47	0,25	47,5	0,95	48,9
	48	0,15	48,3	0,8	49,6
	49	0	–	0,65	50,3
	50	0	–	0,55	51,1
	50,4	0	–	0,45	51,3
8	50,5	1,05	52,6	1,85	54,2
	51	0,95	52,9	1,75	54,5
	52	0,8	53,6	1,6	55,2
	53	0,65	54,3	1,45	55,9
	54	0,55	55,1	1,35	56,7
	55	0,4	55,8	1,2	57,4
	56	0,3	56,6	1,1	58,2
	57	0,15	57,3	0,95	58,9
	58	0	–	0,8	59,6
	59	0	–	0,7	60,4
	59,4	0	–	0,6	60,6

* Outer insert with wiper edge (P4840P . .) can only be used 2x

Tool diameter tolerance ranges for Xtra·tec® Insert Drill B421x

Drill type	Tolerance range
Walter Insert Drill B 4212, B 4213 Ø 13,5–59 mm	**without sleeve adapter**

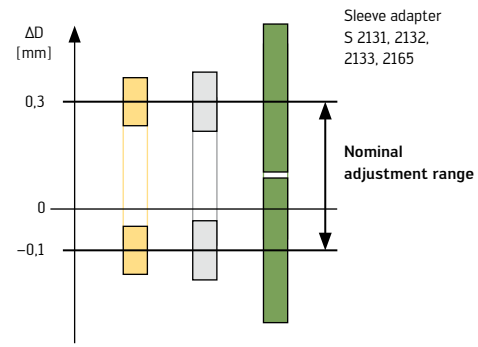


Master insert

Ground insert P 4840

Sintered insert P 4841

with sleeve adapter



The resulting workpiece diameter may differ due to the drilling depth, workpiece material, feed rate and chip removal conditions.

Recommended values for Xtra·tec® Insert Drill B421x

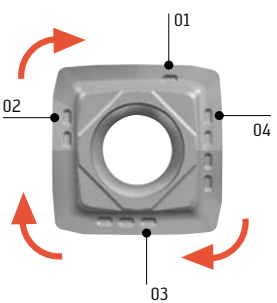
Outer insert
P 484 . P

Outer inserts now in Tiger·tec® Silver

Centre insert
P 484 . C

Symbol for centre insert

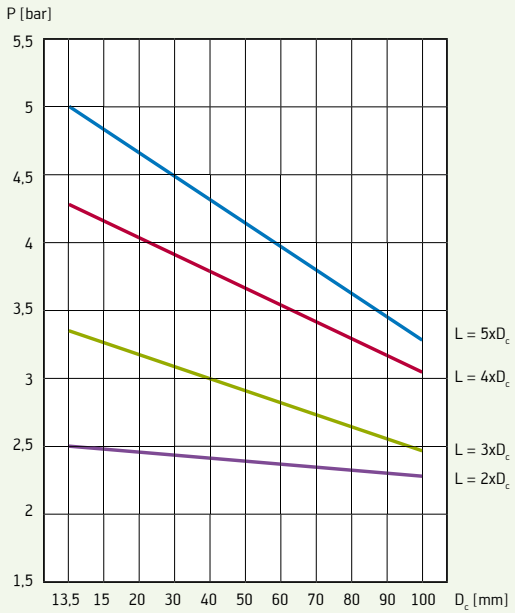
Centre inserts in Tiger·tec® Silver and WXP40



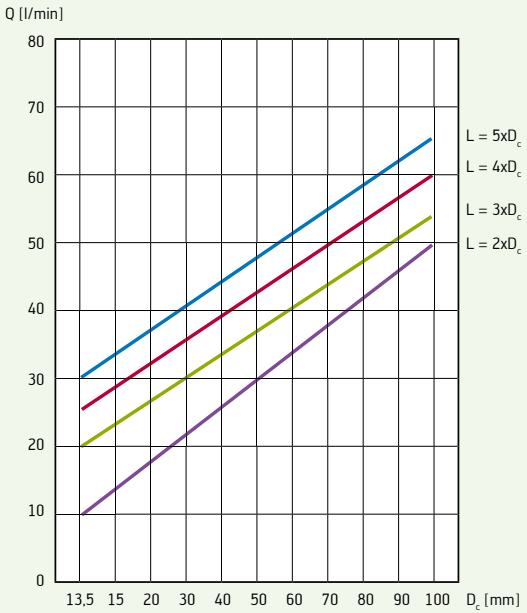
Use
Cutting edge identification for 1st to 4th use

Recommended values for Xtra·tec® Insert Drill B421x

Coolant pressure
for horizontal machining direction



Coolant quantity
for horizontal machining direction



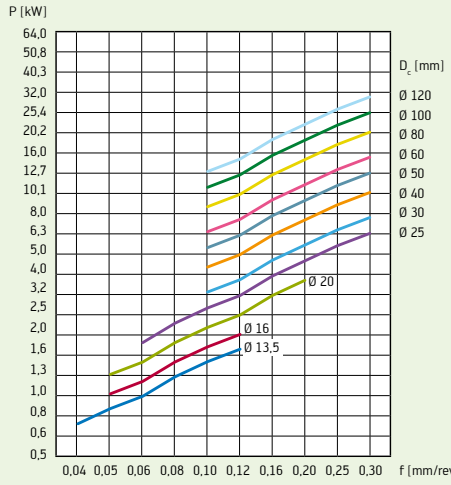
Increase or reduction of coolant flow rate Q and coolant pressure P compared with minimum values:

Poor chip break behaviour: increase by up to + 50 %

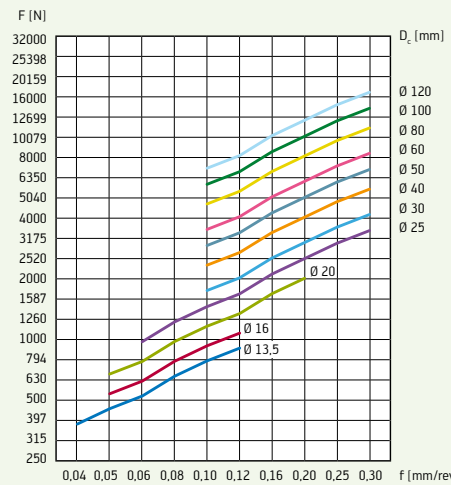
Vertical machining direction: increase by 30 – 40 %

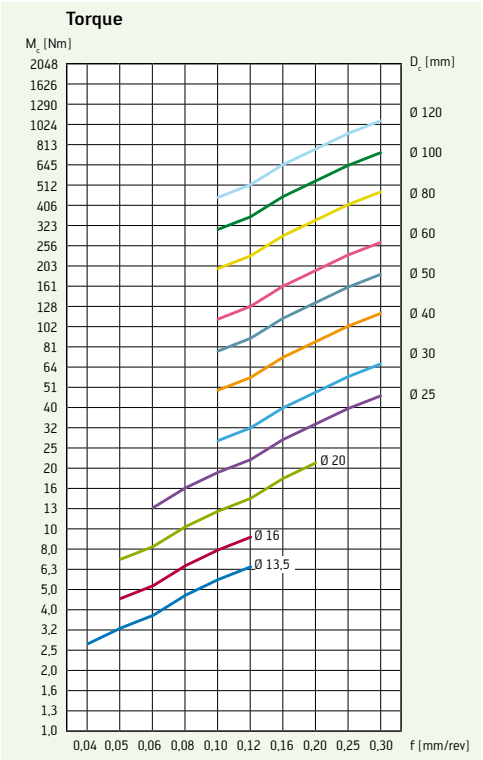
Recommended values for drilling
Xtra·tec® Insert Drill B421x
Material: C45 – (1.0503) steel, steel casting [Rm = 650 N/mm²]

Power requirement [1]



Feed force





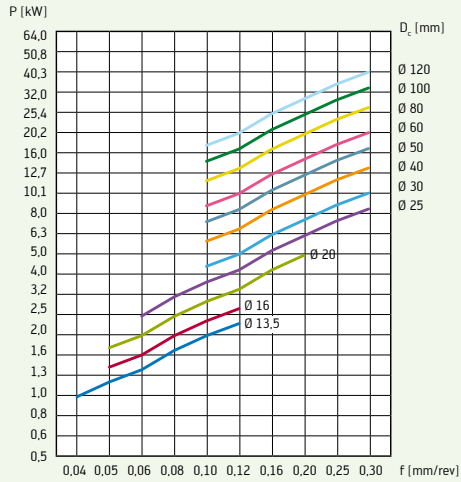
The power requirement [1] data is based on a cutting speed of 100 m/min.

If the cutting speed is doubled, the power requirement also doubles, i.e. the power requirement is directly proportional to the cutting speed.

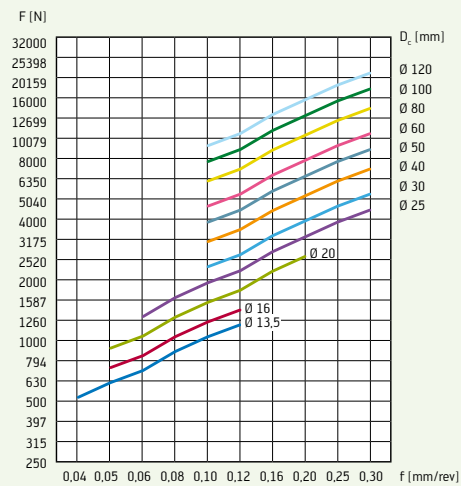
For steels with a higher tensile strength, the power and torque required are correspondingly higher.

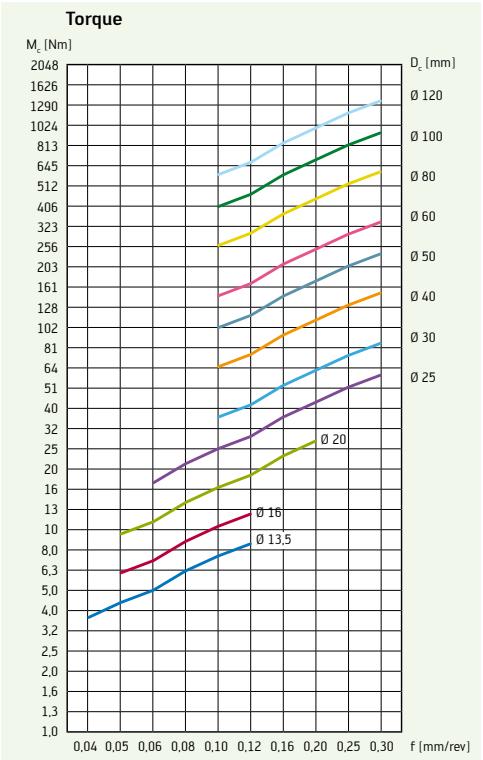
Recommended values for drilling
Xtra·tec® Insert Drill B421x
Material: 42CrMo4 – Cr-Mo alloyed heat treatable steel
[Rm = 750–900 N/mm²]

Power requirement [1]



Feed force





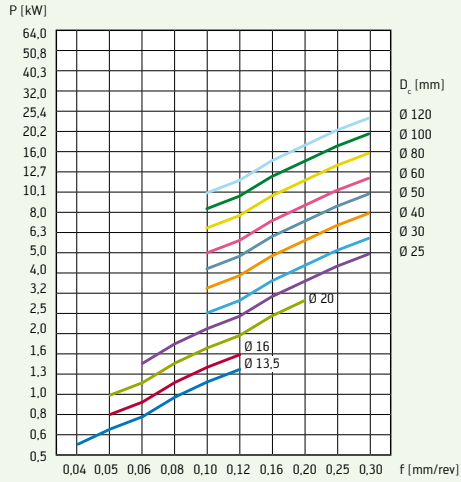
The power requirement [1] data is based on a cutting speed of 100 m/min.

If the cutting speed is doubled, the power requirement also doubles, i.e. the power requirement is directly proportional to the cutting speed.

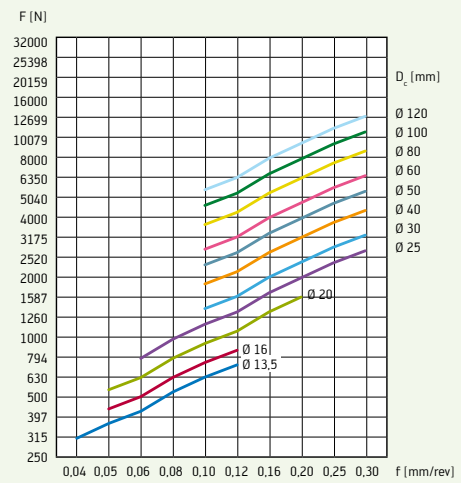
For steels with a higher tensile strength, the power and torque required are correspondingly higher.

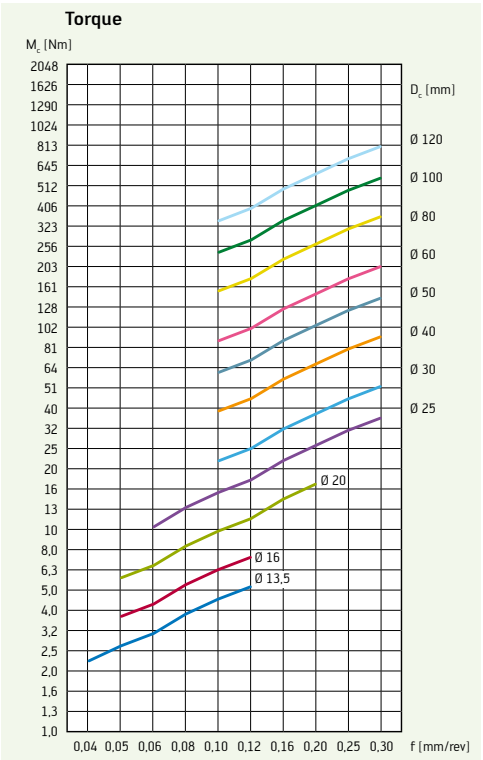
Recommended values for drilling
Xtra·tec® Insert Drill B421x
Material: GG25 – (0.6025) cast iron, ferritic [180–200 HB]

Power requirement [1]



Feed force





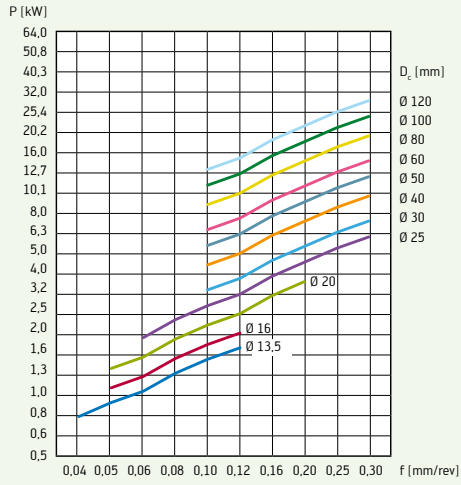
The power requirement [1] data is based on a cutting speed of 100 m/min.

If the cutting speed is doubled, the power requirement also doubles, i.e. the power requirement is directly proportional to the cutting speed.

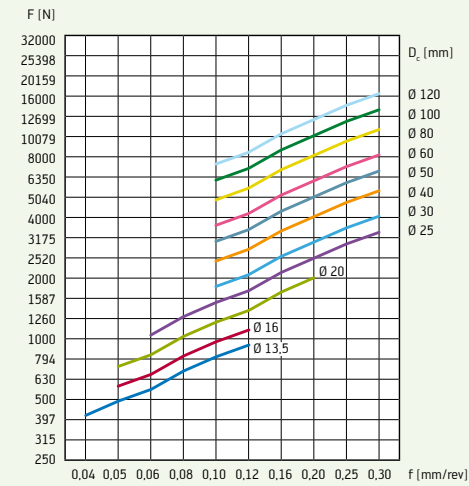
For steels with a higher tensile strength, the power and torque required are correspondingly higher.

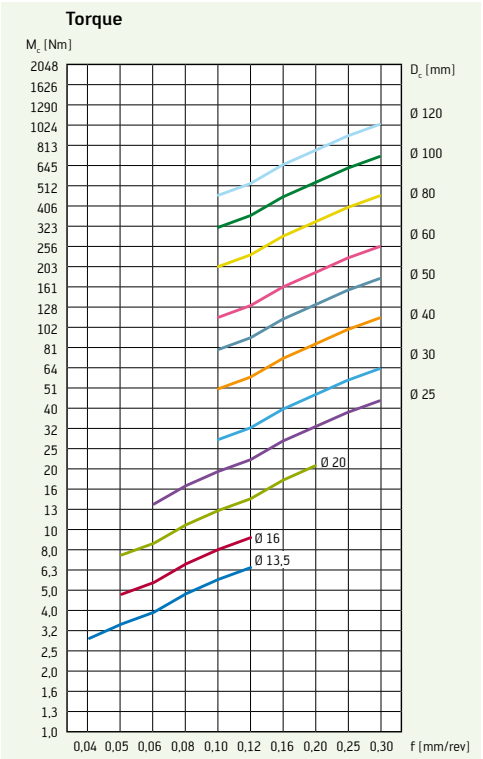
Recommended values for drilling
Xtra·tec® Insert Drill B421x
Material: GGG70 – (0.7070) cast iron with spheroidal graphite [Rm = 690 N/mm²]

Power requirement [1]



Feed force



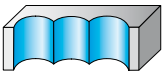


The power requirement [1] data is based on a cutting speed of 100 m/min.

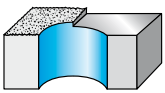
If the cutting speed is doubled, the power requirement also doubles, i.e. the power requirement is directly proportional to the cutting speed.

For steels with a higher tensile strength, the power and torque required are correspondingly higher.

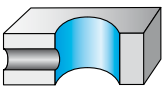
Application possibilities for Xtra·tec® Insert Drill



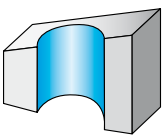
Chain drilling
If problems occur
– Reduce feed by 30 %



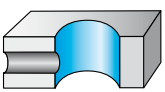
Unmachined and stepped surfaces
If the drill entry angle > 30°
– Reduce feed by 50 % during entry



Interrupted cut
Problems with interrupted cut
– Feed < 30 %



Angled entry drilling
Reduce feed by 30 % during entry

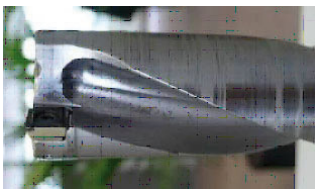


Cross holes
Reducing the feed by 30 % achieves the best results

Stack drilling
Is not possible

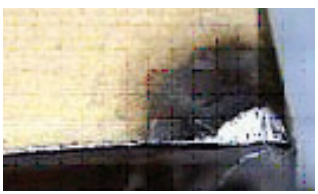
Inner cutting edge breaks

– Check machine alignment (lathe)
– Check workpiece clamping and ensure that there is max. tool stability
– Use tougher carbide grade
– Reduce feed values by 50–70 %



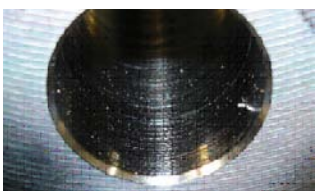
Chip removal not efficient

– Select optimum indexable insert geometry
– Increase coolant pressure
– Increase cutting speed by 20 %
– Optimise chip breaking by increasing feed by ~10 %



Excessive insert wear

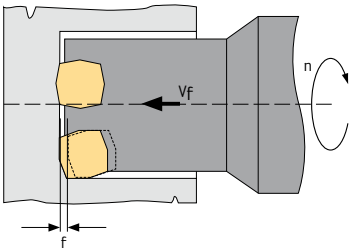
– Reduce cutting speed by 20 %
– Increase coolant pressure
– Use more wear-resistant carbide grade, e.g. WKP25 instead of WKP35



Poor surface quality

– Increase coolant pressure
– Improve clamping situation of workpiece and tool
– Increase cutting speed by 20 %
– Reduce feed by 10 %

Drilling
calculation formulae



Speed n [rpm]	$n = \frac{v_c \cdot 1000}{D_c \cdot \pi}$	[min^{-1}]
Cutting speed v_c [m/min]	$v_c = \frac{D_c \cdot \pi \cdot n}{1000}$	[m/min]
Feed per revolution f [mm]	$f = f_z \cdot Z$	[mm]
Feed rate v_f [mm]	$v_f = f \cdot n$	[mm/min]
Metal removal rate Q [cm³/min]	$Q = \frac{v_f \cdot \pi \cdot D_c^2}{4 \cdot 1000}$	[cm^3/min]
Power requirement P_{mot} [kW]	$P_{mot} = \frac{Q \cdot k_c}{60000 \cdot \eta}$	[kW]
Feed force F_f [N]	$F_f = 0{,}63 \cdot \frac{f \cdot D_c \cdot k_c}{2}$	[N]
Specific cutting force k_c [N/mm²]	$k_c = \frac{k_c 1.1}{h^{m_c}}$	[N/mm^2]
Chip thickness h [mm]	$h = fz \cdot \sin\kappa$	[mm]
Torque M_c [Nm]	$M_c = \frac{D_c^2 \cdot k_c \cdot f}{8000} = \frac{P_{mot} \cdot 9500}{n}$	[Nm]


WALTER

Cutting forces of Walter machining groups

Cutting forces

Description
Non-alloyed and low-alloy steels, C > 0,25 %, low and medium strength
Unalloyed and low-alloy steels, C > 0,55 %, not heat treated
Low and high-alloy steels, low tempering level
Stainless ferritic/martensitic steels, heat treated
Low and high-alloy steels, medium tempering level
Low and high-alloy steels, high tempering level
Stainless, austenitic steels
Stainless, austenitic/ferritic steel + duplex
Stainless, austenitic steels, precipitation hardened (PH steels)
Grey cast iron + CGI + malleable cast iron, low tensile strength
Ductile cast iron low tensile strength + malleable cast iron with higher tensile strength
Grey cast iron with higher tensile strength
Ductile cast iron with high tensile strength + ADI high tensile strength, unalloyed + alloyed
Aluminium wrought alloy, not precipitation hardened
Aluminium wrought alloy, precipitation hardened
Cast aluminium alloy < 12 % Si, not precipitation hardened
Cast aluminium alloy < 12 % Si, precipitation hardened, cast aluminium alloy ≥ 12 %
Pure copper, copper alloy (brass, bronze) with low tensile strength
High tensile strength copper alloy, bronze with high tensile strength
Heat-resistant alloys, iron-based, annealed
Heat-resistant alloys, iron-based, precipitation hardened
Pure titanium
Titanium alloys, alpha, alpha/beta and beta alloys
Heat-resistant alloys, nickel-cobalt-based, annealed
Heat-resistant alloys, nickel-cobalt-based, precipitation hardened
Heat-resistant alloys, nickel-cobalt-based, cast
Hardened steels 46 – 52 HRC
Hardened steels 52 – 58 HRC
Hardened steels 58 – 62 HRC
Hardened cast iron 50 – 60 HRC
Thermoplasts and duroplasts, without abrasive fillers
Fibre-reinforced plastics
Graphite

Comments:
The information consists of guideline values and relates to neutral cutting edge geometry. The condition of the workpiece material and the cutting edge geometry have considerable influence on the cutting forces.

Tensile strength		Spec. cutting force	Increase value	Walter machining group
min	max			
R_m		$k_{c1.1}$	m_c	
[N/mm²]		[N/mm²]		
350	750	1500	0,21	P1, P6
400	900	1700	0,25	P2, P3, P4, P7, P14
750	1100	2000	0,25	P5, P8, P11, P12
800	1400	2200	0,25	P15
1100	1400	2500	0,25	P9
1200	1600	3000	0,25	P10, P13
400	900	1800	0,21	M1
600	1000	2000	0,21	M3
700	1500	2400	0,21	M2
200	400	800	0,28	K1, K3, K7
400	600	950	0,28	K2, K5
300	400	1200	0,28	K4,
600	800	1400	0,28	K6
		350	0,25	N1
		600	0,25	N2
		600	0,25	N3
		700	0,25	N4, N5
		550	0,25	N7, N8, N9
		1000	0,25	N10
		2400	0,25	S1
		2500	0,25	S2
		1300	0,25	S6
		1500	0,25	S7, S8
		2800	0,25	S3
		2900	0,25	S4
		3000	0,25	S5
		3000	0,25	H1
		3700	0,25	H2
		4300	0,25	H3
		3500	0,25	H4
		150	0,2	O1, O2
		300	0,3	O3, O4, O5
		400	0,25	O6

Notes

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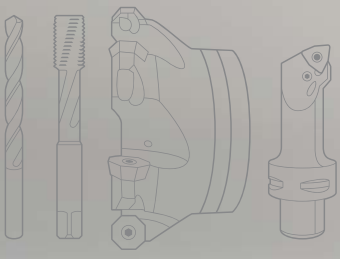

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Printed in Germany 625 6469 (05/2012) EN