

# Processing recommendation

## Kaindl Optimatt and Optiboard

When shape cutting Kaindl chipboards and MDF boards with anti-fingerprint film (AFP film) by sawing, milling, grooving and drilling, care must be taken to select suitable tools and machining parameters. The incorrect choice of tools and their operating conditions can lead to crimping, improper heating or damage.

### General processing guidelines

When processing boards with AFP coating, the guide values from the table indicating the right choice of cutting speed ( $v_c$ ) and of the feed per tooth ( $f_z$ ) should be observed, depending on the processing method.

Processing procedures	Cutting speed $v_c$ [m/s]
Sawing	60 – 90
Machining	60 – 80
Milling	50 – 70
Routing	10 – 35
Drilling	0.5 – 2.0

Processing procedures	Feed per tooth $f_z$ [mm]
Sawing	0.02 – 0.12
Machining	0.12 – 0.18
Milling	0.30 – 0.55
Routing	0.15 – 0.25
Drilling	0.03 – 0.12

These parameters are related to the tool diameter ( $D$ ), the number of teeth ( $Z$ ), the rotational speed ( $n$ ) and the feed speed ( $v_f$ ) when used on the processing machine. The correct choice of these factors is key for a good processing result.

For the calculation of cutting speed, feed per tooth and feed speed the below formulas apply:

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### $v_c$ - Cutting speed [m/s]

$$v_c = D \cdot \pi \cdot n / 60 \cdot 1000$$

D - Tool diameter [mm]

n - Tool speed [ $\text{min}^{-1}$ ]

### $f_z$ – Feed per tooth [mm]

$$f_z = v_f \cdot 1000 / n \cdot z$$

$v_f$  – Feed speed [m/min]

n – Tool speed [ $\text{min}^{-1}$ ]

z – Number of teeth

### $v_f$ – Feed speed [m/min-1]

$$v_f = f_z \cdot n \cdot z / 1000$$

$f_z$  – Feed per tooth [mm]

n – Tool speed [ $\text{min}^{-1}$ ]

z – Number of teeth

### Tools in general

For optimum processing quality, tools with new or newly restored cutting blades are recommended.

### Cutting materials

Basically, both tools with hard-metal blades (HW) and diamond blades (DP, polycrystalline diamond) can be used. In order to achieve a longer tool life despite high cutting volume, the use of tools with diamond blades (DP) is recommended.

## CUTTING OF THE BOARDS WITH CIRCULAR SAW BLADES

In general, these rules should be observed:

- Visible side (decor side with film) upwards

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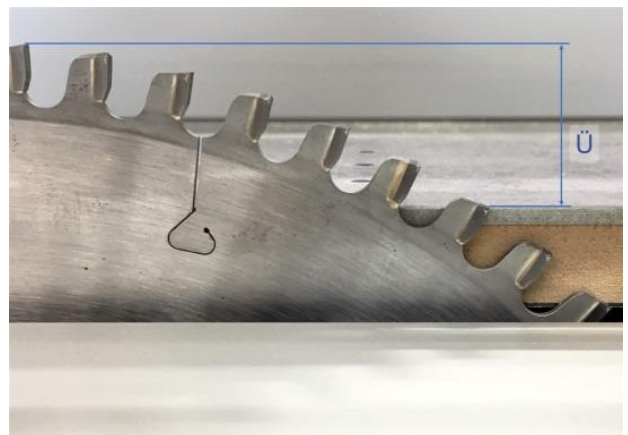
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- Pay attention to correct saw blade protrusion (see table)
- Adjust the speed and number of teeth to the feed speed
- Use of a Ritz circular saw blade is recommended for clean cuts at the bottom of the board

Depending on the saw blade protrusion, the angle of entry and exit and thus the quality of the cutting edge may change. If the upper cutting edge is unclean, the saw blade must be set higher. In case of an unclean cut at the bottom, the saw blade must be adjusted deeper. This is how the most favourable height setting is determined.

For format and panel sizing saws, the following saw blade protrusions (Ü) must be set, depending on the diameter (D):

Circular saw blade diameter D [mm]	Protrusion Ü [mm]
D 250	approx. 5 - 10
D 300	
D 350	
D 400	
D 450	

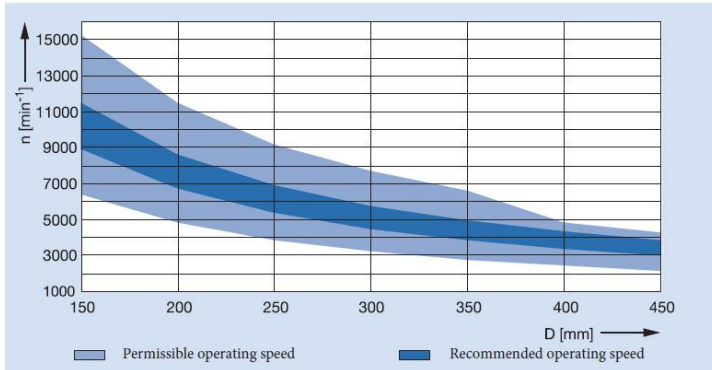


For a good processing quality, we generally recommend circular saw blades with a high number of teeth.

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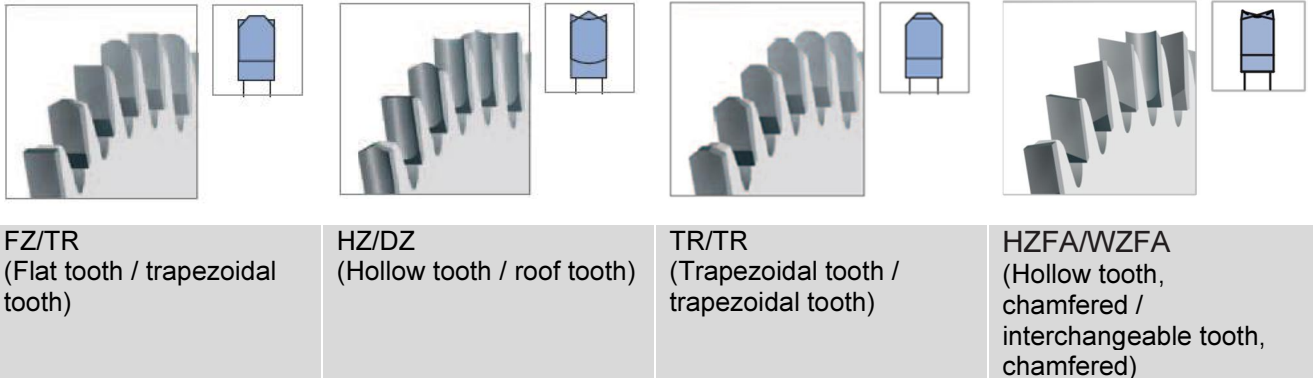
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When sawing with HW-equipped circular saw blades, the recommended cutting speed is  $v_c$  60-80 m/s. For DP-equipped circular saw blades, the cutting speed can be increased up to  $v_c$  90 m/s.



Speed diagram - depending on the diameter of the circular saw blade

### Recommended shapes of teeth



### Format saws

with the tooth shape hollow tooth/roof tooth (HZ/DZ) provide the best cutting results. The tooth shape flat tooth/trapezoidal tooth (FZ/TR) also offers good cutting results with a slightly higher tool life path compared to HZ/DZ. For work-environment-friendly processing, we recommend WhisperCut circular saw blades with DP cutting material. WhisperCut circular saw blades produce up to 10 dB(A) less noise and can be used with standard wedges on machines with a scoring unit.

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### Format cut without scoring *Excellent*

D Mm	SB Mm	TDI Mm	BO Mm	NLA Mm	Z	ZF	SW Degree	ID
250	3.2	2.2	30	KNL	54	HZ/DZ	10	<b>161300</b>
303	3.2	2.2	30	KNL	68	HZ/DZ	10	<b>161301</b>
350	3.5	2.5	30	KNL	80	HZ/DZ	10	<b>161302</b>

Further dimensions are available on request

### Format cut with scoring *Premium*

D Mm	SB Mm	TDI Mm	BO Mm	NLA Mm	Z	ZF	SW Degree	ID	D Mm
250	3.2	2.2	30	KNL	60	FZ/TR	Ut	10	<b>163002</b>
250	3.2	2.2	30	KNL	80	FZ/TR		10	<b>163003</b>
300	3.2	2.2	30	KNL	72	FZ/TR	Ut	10	<b>163005</b>
300	3.2	2.2	30	KNL	96	FZ/TR		10	<b>163006</b>
350	3.5	2.5	30	KNL	84	FZ/TR	Ut	10	<b>163007</b>
350	3.5	2.5	30	KNL	108	FZ/TR		10	<b>163008</b>

Further dimensions are available on request

### Format Cut *Excellent* – WhisperCut

D Mm	SB Mm	TDI Mm	BO Mm	NLA Mm	Z	ZF	SW Degree	ID
250	3.2	2.4	30	KNL	50	HZF/WZFA	10	<b>190697</b>
303	3.2	2.4	30	KNL	60	HZF/WZFA	10	<b>190698</b>
350	3.2	2.4	30	KNL	70	HZF/WZFA	10	<b>190699</b>

Further dimensions are available on request

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### Panel sizing saws

with tooth-shape combinations such as flat/trapezoidal tooth (FZ/TR) or trapezoidal/trapezoidal tooth (TR/TR) are recommended. The circular saw blade RazorCut (TR/TR) achieves the best cutting quality.

### Sizing of single panels and panel packages – *Premium*

D Mm	SB Mm	TDI Mm	BO Mm	NLA Mm	Z	ZF	SW Degree	ID
300	4.4	3.2	30	KNL	60	FZ/TR	15	163400
350	4.4	3.2	30	KNL	72	FZ/TR	15	163408
350	4.4	3.2	60	2/14/100	72	FZ/TR	15	163409
380	4.4	3.2	60	2/14/100 2/14/125	72	FZ/TR	15	163418
380	4.8	3.5	60	2/14/100 2/14/125	72	FZ/TR	15	163419

Further dimensions are available on request

### Sizing of single panels in prefabricated cutting quality *Excellent* – RazorCut

D Mm	SB Mm	TDI Mm	BO Mm	NLA Mm	Z	ZF	SW Degree	ID
300	4.4	3.2	30	KNL	60	TR/TR	15	161102
350	4.4	3.2	30	KNL	72	TR/TR	15	161108
350	4.4	3.2	60	2/14/100	72	TR/TR	15	161109
380	4.4	3.2	60	2/14/100 2/14/125	72	TR/TR	15	161116
380	4.8	3.5	60	2/14/100 2/14/125	72	TR/TR	15	161117

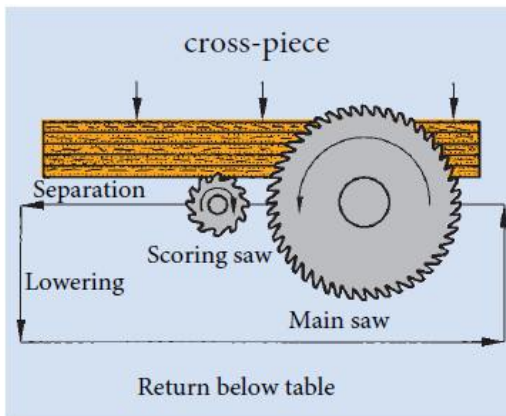
Further dimensions are available on request

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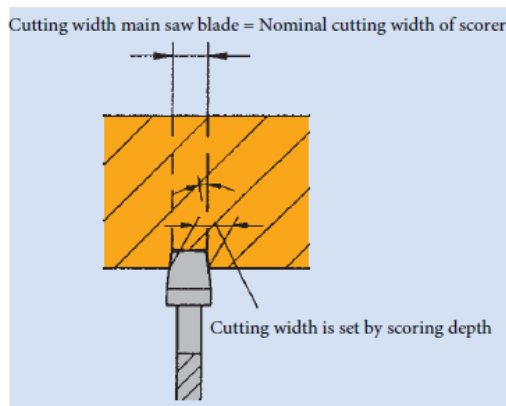
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### Scoring circular saw blades

In the case of coated work pieces, the use of a pre-scoring unit is recommended to achieve good cutting-edge quality on the tooth outlet side. The cutting width of the scoring circular saw blade is to be adjusted slightly larger than that of the main circular saw blade, so that the protruding tooth of the main saw can no longer touch the cutting edge. On bench saws and format circular sawing machines, split scoring circular saw blades are used.



Panel sizing system with scoring unit and pressure device



Application scheme of a conical scoring circular saw blade. When repairing the tools, it is recommended to sharpen the scoring circular saw blades with the main saws in a set.

All dimensions are available on request

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### PRE-MILLING MACHINES ON BENCH MILLS OR CONTINUOUS SYSTEMS

Knife heads with HW insert knives or DP-fitted cutters are generally suitable for the machining of panels with AFP décor. In order to create breakout-free edges on the top layers of the panel, joining tools with a change of the purulent axis angle must be used. The use of joining cutters with a larger axis angle ( $>30^\circ$ ) is beneficial. Particularly recommended is the use of the EdgeExpert pre-milling system with an axis angle of up to  $54^\circ$ .

Format processing tools with a higher number of teeth (Z) tend to achieve better cut quality compared to standard tools. In order to minimize tool wear, a low chip removal between 0.7 and 2.0 mm must be taken into account.

When working on bench milling machines with hand feed, only tools labelled "MAN" or "BG-Test" may be used. For safety reasons, the speed range specified on the tool must not be exceeded or fallen below. The tools for hand feed are to be used only in the counter-run.

The best milling results can be achieved with tools with high concentricity accuracy and balancing quality. These two components are obtained by using centering intersections, such as hydro-clamping systems, HSK mounts or shrink systems.

The insert parameters for joining must be selected in such a way that the feed per tooth is between 0.30 and 0.60 mm.



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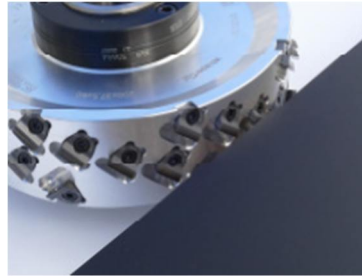
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## JOINING

Examples of tools:



DP WhisperCut joining cutter



DP- WhisperCut EdgeExpert



DP joining cutter, permanently equipped



DP-joining cutter EdgeExpert

Dimensions DxBxB0 [mm]	Rotational speed n [min <sup>-1</sup> ]	Number of teeth Z	Feed speed v <sub>f</sub> [m/min]	Leitz ID, DP WhisperCut		Machine
				LI	RI	
85x43x30	12,000	3	14 - 25	192076	192077	Ott
100x32x30	12,000	3	14 - 25	192090	192091	IMA
100x43x30	12,000	2	8 - 18	192082	192083	Stefani, Holz Her
100x43x30	12,000	2	8 - 18	192080	192081	Hebrock, EBM
100x43x30	12,000	3	14 - 25	192088	192088	Biesse
100x43x30	12,000	3	14 - 25	90885	90886	Brandt
125x32x30	9,000	3	14 - 25	192092	192093	IMA
125x43x30	9,000	3	14 - 25	75627	75627	Homag, Biesse
125x43x30	9,000	3	14 - 25	192094	192095	IMA

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## CHIPPER FOR CONTINUOUS MACHINES

Recommended are diamond compact chippers that produce little friction and cutting pressure. The type Diamaster DT Premium is particularly suitable – mounted on a hydro-clamping element for highest round and flat runs, excellent machining quality and long tool life. The cutting speed ( $v_c$ ) is 80 m/s at the usual speed ( $n$ ) 6000  $\text{min}^{-1}$  and diameter ( $D$ ) 250 mm. Operating parameters and the number of teeth of the chippers should be chosen so that the feed per tooth ( $f_z$ ) is between 0.12 and 0.16 mm.

Dimension DxSBxBo [mm]	Speed n [ $\text{min}^{-1}$ ]	Number of teeth Z	Feed speed $v_f$ [m/min]	Leitz-ID, DT Premium	
				LI	RI
250x10x60	6,000	24	15 – 24	190410	190411
250x10x60	6,000	36	25 – 35	190418	190419
250x10x60	6,000	48	35 – 45	190426	190427
250x10x60	6,000	60	45 – 55	190434	190435

Further dimensions are available on request



Compact cutter DT Premium

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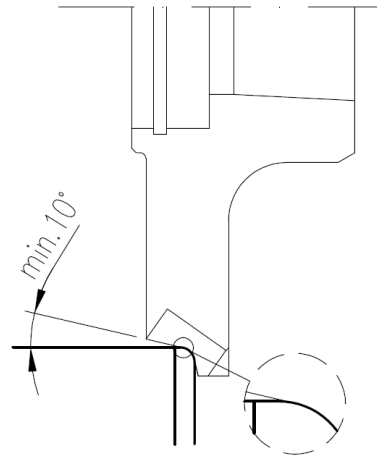
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## EDGE PROCESSING ON EDGE BANDING MACHINES

Radius cutters and drawing blades on edge banding machines shall be adjusted in such a way that the tools do not touch the carrier material and do not damage the protective film.

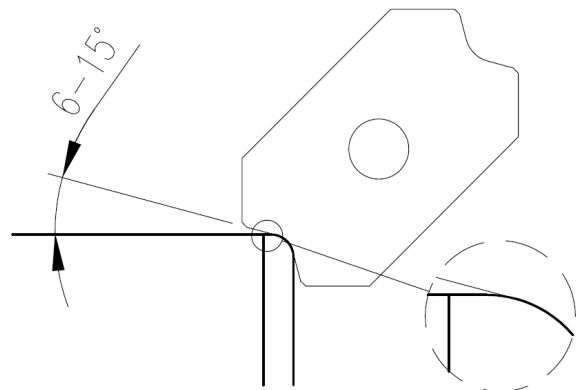
### Radius / chamfer cutters

Radius cutters should have a profile spout of at least 10°. The adjustment of the radius and chamfer cutters must be selected in such a way that no contact with the protective film is made.



### Profile drawing blades

Profile drawing blades are equipped with a profile spout and can be used with any problems if exactly adjusted, for post-processing of the Kaindl AFP panels. In order to avoid damage to the protective film, drawing blades with an enlarged profile outlet of up to 15° are recommended.

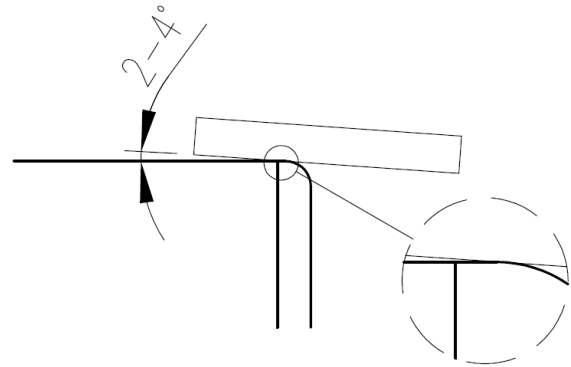


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### Flat drawing blades

Flat drawing blades should preferably have an inclined position of 2-4° from the edge to the panel and shall not touch the protective film.



### GROOVE PROCESSING

For groove processing, tools with a high number of teeth should be preferred for optimum edge quality. The feed per tooth ( $f_z$ ) should be in the range of 0.03 - 0.06 mm when machining in synchronisation (GLL).

Diameter D [mm]	Speed n [ $\text{min}^{-1}$ ]	Number of teeth Z	Feed speed $v_f$ [m/min]
180	6000	36	7 - 14
200	6000	48	8 - 16

Further dimensions are available on request

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## CNC STATIONARY MACHINES

### Formatting and joining with routers

Spiral solid carbide milling cutters (VHW) or preferably DP routing machines are best suited for machining on routing machines and in machining centres. In order to create breakout-free edges on the top layers of the panel, DP routers with a spiral cutting arrangement with a reciprocal axis angle are to be used. Advantageous is the use of routers with an enlarged axis angle ( $>30^\circ$ ). For the processing of the AFP coating, the use of the Diamaster EdgeExpert routers with a large axis angle of up to  $54^\circ$  is recommended. This guarantees the best edge quality, as required for zero joint edging, for example.

To support the vacuum suction cups, additional mechanical clamps can be added if necessary. For the highest concentricity, balancing quality and perfect cutting quality, the stable shrink chuck Thermo-Grip® is used.

A good machining result can only be achieved with sufficient rigidity of the machine, such as in portal machines.



### Recommended usage data:

Rotational speed  $n = 18,000 - 24,000 \text{ min}^{-1}$

Feed speed ( $v_f$ ):

Z2 = 8 - 10 m/min

Z3 = 14 - 18 m/min

Z2 Nesting = 20 - 24 m/min

Feed per tooth ( $f_z$ ):

$f_z = 0.15 - 0.25 \text{ mm}$

Nesting  $f_z = 0.40 - 0.60 \text{ mm}$

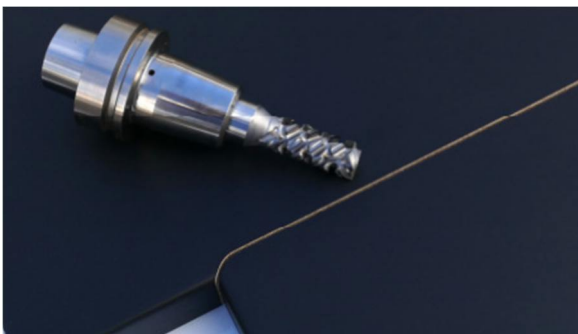
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Dimension D x NL x S [mm]	Number of teeth Z	Direction	Execution	Leitz ID No.
16 x 28 x 20	2 + 2	RI	Diamaster PRO	191042
20 x 28 x 20	2 + 2	RI	Diamaster Quattro	091235
20 x 28 x 20	3 + 3	RI	Diamaster PLUS3	191051
12 x 24 x 12	2 + 2	RI	Diamaster PRO, Nesting	191060
20 x 32 x 20	2 + 2	RI	Diamaster Quattro EdgeExpert	191071
20 x 48 x 25	2 + 2	RI	Diamaster Quattro EdgeExpert	191072
25 x 30 x 25	3 + 3	RI	Diamaster PLUS3 EdgeExpert	191073
25 x 35 x 25	3 + 3	RI	Diamaster PLUS3 EdgeExpert	191074
25 x 48 x 25	3 + 3	RI	Diamaster PLUS3 EdgeExpert	191075

Further dimensions are available on request

### Examples for processing – EdgeExpert





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### Through hole drills

Speed  $n$  [ $\text{min}^{-1}$ ] 4000 – 6000

Feed speed  $v_f$  [m/min] 0.5 – 1.0

Dimension DxNLxGL [mm]	Number of teeth Z	Execution	Leitz ID	
			LI	RI
5 x 35 x 70	Z 2 / V2	HW Through hole drill Standard	34074	34075
8 x 35 x 70	Z 2 / V2	HW Through hole drill Standard	34076	34077
5 x 35 x 70	Z 2 / V2	HW Solid through hole drill Excellent	34100	34101
8 x 35 x 70	Z 2 / V2	HW Solid through hole drill Excellent	34104	34105

Further dimensions are available on request

### Impact drills

Speed  $n$  [ $\text{min}^{-1}$ ] 3000 – 4500

Feed speed  $v_f$  [m/min] 0.5 – 1.0

Impact drillholes can be drilled preferentially with solid carbide impact drills. The following tools are recommended for this purpose:

Dimension DxNLxGL [mm]	Number of teeth Z	Execution	Leitz ID	
			LI	RI
15 x 70	Z 2 / V2	HW Solid impact drill Excellent	37203	37204
20 x 70	Z 2 / V2	HW Solid impact drill Excellent	37205	37206
25 x 70	Z 2 / V2	HW Solid impact drill Excellent	37207	37208
26 x 70	Z 2 / V2	HW Solid impact drill Excellent	37209	37210
30 x 70	Z 2 / V2	HW Solid impact drill Excellent	37211	37212
35 x 70	Z 2 / V2	HW Solid impact drill Excellent	37213	37214

Further dimensions are available on request



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### **TOOL LIVES**

Tool lives depend on a variety of influencing factors. Therefore, no statements regarding tool life or any rights can be derived from these processing guidelines. The information on the tools and the machining parameters are recommended guide values. Machine- or process-related constellations can lead to different operating parameters. An optimal adaptation of machine, tool and material as well as customer-specific requirements can only be made on site together with a Leitz application technician.