

TCT Circular Saw Blades ○ PCD Circular Saw Blades ○ Band Saw Blades

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Tungsten carbide tipped (TCT) circular saw blades from PILANA Wood are manufactured from high quality German steels with the use of TC tips made for specific application based on their hardness/tenacity grade. Bodies have typically the hardness of 45-48 HRC and the complete saw bodies are laser-cut.

Expansion slots located around the saw body are specially shaped for each cutting application. As a result, they prevent blade deformation and improve cutting quality in difficult working conditions. Low-noise slots in the steel saw body reduce noise generated by the saw in the movement and allow for pleasant working conditions .

High attention is also paid to the saw blade stability, tolerances of the outer and side run and tensioning of the body thus reaching the best cutting results possible. The last but not least important parameter is the sharpening of the TC carbide tips - ideal cutting edge/ tooth shape guarantees optimal quality cutting.

Constantly renewed machine park (Vollmer sharpening machines, Kirschner and Gerling brazing machines, Trumpf lasering machines etc.) together with the best quality grinding discs/soldering material enable us to sustain high top quality of our saw blades for our customers of more than 90 countries in the world.

Tooth Geometry of TCT Circular Saw Blades

	FZ	flat tooth		TFZ	triple chip tooth alternating with flat tooth		alternate top and axial bevel
	FZ N	flat tooth with negative hook angle		TFZ N	triple chip tooth alternating with flat tooth with negative hook angle		
	LFZ	flat tooth with chip limiter					
	WZ	alternate top bevel		DHZ	hollow face tooth (flat tooth alternates with inverted "V" tooth)	WZ/FA	flat tooth with bevel
	WZ N	alternate top bevel with negative hook angle		DHZ N	hollow face tooth (flat tooth alternates with inverted "V" tooth), negative hook angle		
	LWZ	alternate top bevel with chip limiter					
	TZ	triple chip tooth		KON FZ	conical tooth	WZ/W	alternate tooth with double bevel
	TZ/TZ			KON WZ			
	KXZ FZ	barrel tooth		WZ/FA/K	plexi	WZ/FA/N	flat tooth with bevel with negative hook angle

List of Carbide Tip Grades:

Grades of tips			
K 01	K 10	K 20	K 30
Hardness [HV 30]	Hardness [HV 30]	Hardness [HV 30]	Hardness [HV 30]
1900 – 2250	1740 – 1800	1520 – 1600	1140 – 1510
Tips of K01 grade are very resistible against abrasion. Powdered grain (ultra fine grain) is very fine. Its grade is applicable for cutting hard materials. For example MDF, chipboard, HDF, double side laminated chipboard etc.	Tips with optimal combination of fine-grained structure and material hardness applicable for universal usage. Best for cutting wood, plastics, non – ferrous metals, plywood, plaster boards etc.	Tips containing higher percentage of cobalt binding material enable better tooth tenacity and therefore higher resistance while encountering other material types (branch knots, dirt, steel chips etc.). Tips are applicable for cutting along the grain of natural woods.	High percentage of cobalt binding material with lower hardness enables K30 tips high tenacity and resistance against breaking. This grade is best applicable for cutting in extreme conditions (i.e. cutting frozen wood).

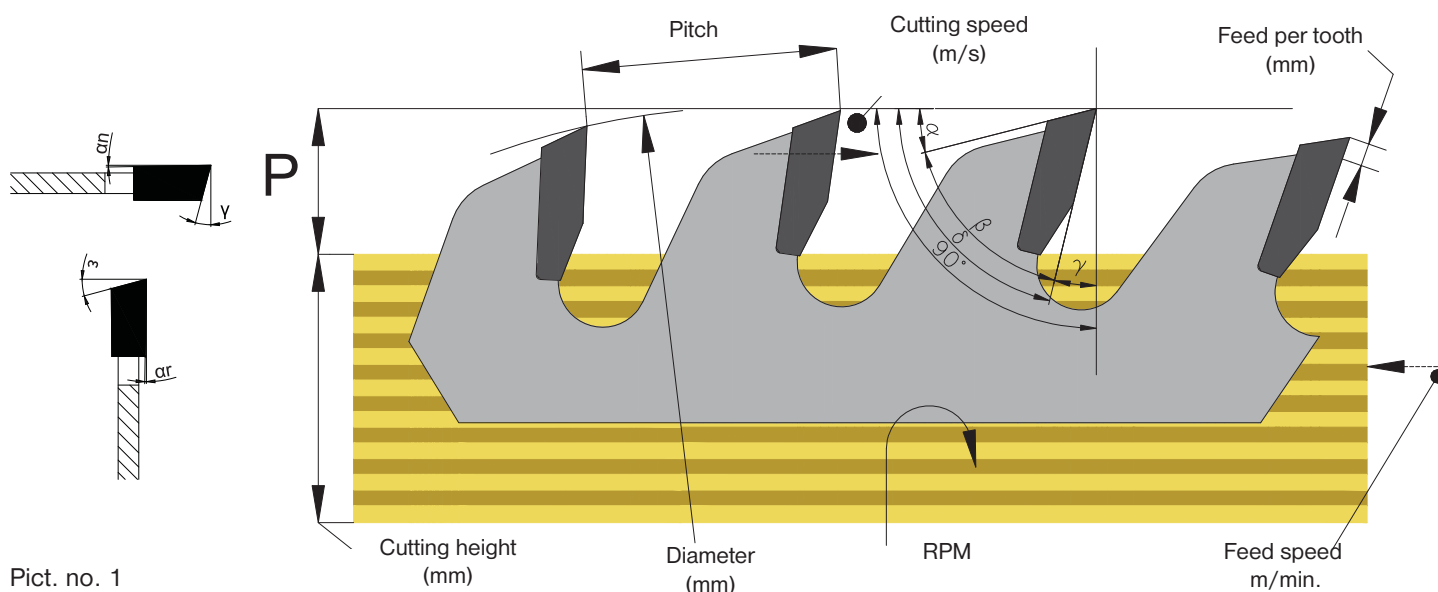
Hardness

Tenacity

Saw Blade Alignment on a Table Saw

In order to reach the best performance of a saw blade, the overhang of the saw blade teeth over the cutting material must be equal to the height of the tungsten tip (see P in picture no. 1).

The number of teeth cutting simultaneously in the material must be between 2-3.



Pict. no. 1

Tab. no. 1

Recommended values of feed/tooth		
Cutting speed (m/s)	Feed speed (mm/tooth)	Material
60-100	0,1-0,35	dry transverse
60-100	0,15-0,5	dry longitudinal
50-90	0,06-0,15	hard wood
60-100	0,6-1,5	pre-saw
60-80	0,05-0,12	laminated
60-90	0,05-0,15	veneer
50-80	0,1-0,3	chipboard
50-70	0,05-0,12	plastic
50-80	0,03-0,1	plexi, bakelite
30-70	0,03-0,15	plastic profile
30-70	0,01-0,08	aluminium
7-20	0,02-0,05	copper
40-60	0,1-0,3	heraclitus
50-70	0,1-0,25	plasterboard
50-80	0,05-0,25	plywood
50-70	0,05-0,12	corian
60-90	0,05-0,25	MDF,HDF
15-60	0,02-0,1	aluminium alloys
50-70	0,02-0,1	HPL
20-45	0,07-0,15	mineral wool
3-10	0,02-0,08	bronze
50-70	0,1-0,3	paper
40-60	0,03-0,1	cement board
25-35	0,01-0,02	dry cut

Index of angles in a saw blade

α	clearance angle
αn	tangential clearance angle
αr	radial clearance angle
β	wedge angle
γ	hook angle
δ	cut angle = $\alpha + \beta$
λ	shear angle
ϵ	bevel angle

Tab. no. 2 Cutting speed m/s

D [mm]	RPM														
	1500	2000	2500	2850	3000	4000	4500	5000	5600	6000	8000	9000	10000	12000	18000
ø 80	6,5	8,5	10,5	12	13	17	19	21	23,5	26	34	38	42	52	76
ø 90	7	9,5	12	13,5	14	19	21	24	26,5	28	38	42	48	56	84
ø 100	8	10,5	13	15	16	21	24	26	29	32	42	48	52	54	96
ø 120	9,5	13	16	18	19	26	28	32	35	38	52	56	64	76	112
ø 125	10	13,5	16,5	18,5	19,5	27	29	33	36,5	39	54	59	66	78	118
ø 140	11	15	18	21	22	30	33	36	41	44	60	66	72	88	132
ø 150	12	15,5	19,5	22,5	23,5	31,5	33,5	39	44	47	63	70,5	78,5	94,5	141,5
ø 160	13	17	21	24	26	34	38	42	48	52	68	76	84	104	152
ø 180	14	19	24	27	28	38	42,5	48	53	56	76	85	96	118	170
ø 200	16	21	26	30	32	42	47	52	58,5	64	84	94	104	128	188
ø 225	18	24	30	33,5	36	48	58	60	66	72	96	106	120	144	212
ø 250	20	26	33	37	40	52	59	66	73,5	80	104	118	132	160	236
ø 300	24	31,5	40	45	48	63	71	80	88	96	126	142	160	192	284
ø 350	28	36,5	47	52	56	73	88	94	105	112	146	166	188	224	332
ø 400	32	42	54	60	64	84	94	108	117	128	168	188	216	256	376
ø 450	35,5	47	59	67,5	70,5	94,5	106	118	132	141,6	188	211	236	283	424
ø 500	40	53	67	74,5	80	106	118	134	146,5	160	212	236	268	320	472

Tab. no. 2 shows the maximum RPM of circular saw blade based on the diameter of the blade. RPM referring to cutting speed 100 m/sec. These are the maximum recommended RPM by the machine producer. When exceeding this limit, the blade may lose its characteristics and danger to user may occur.

Tab. no. 3

D [mm]	Recommended RPM [1/min]									
	Cutting speed v_c [m/s]									
	10	20	30	40	50	60	70	80	90	100
100	1910	3820	5730	7640	9550	11460	13370	15280	17190	19100
150	1270	2550	3820	5100	6370	7640	8920	10190	11500	12730
200	960	1910	2870	3820	4780	5730	6690	7640	8600	9550
250	760	1530	2290	3060	3820	4590	5350	6110	6880	7640
300	640	1270	1910	2550	3180	3820	4460	5100	5740	6370
350	550	1090	1640	2180	2730	3280	3820	4370	4900	5460
400	480	960	1430	1910	2390	2870	3340	3820	4300	4780
450	430	850	1270	1700	2120	2550	2970	3400	3820	4250
500	380	760	1150	1530	1910	2290	2680	3060	3440	3820
550	350	690	1040	1390	1740	2080	2430	2780	3120	3470
600	320	640	960	1270	1590	1910	2230	2550	2880	3180
650	290	590	880	1180	1470	1760	2060	2350	2640	2940
700	270	550	820	1090	1360	1640	1910	2180	2450	2730
750	250	510	760	1020	1270	1530	1780	2040	2290	2550
800	240	480	720	950	1190	1430	1670	1910	2150	2390

$$v_c = \frac{D \times \pi \times n}{1000 \times 60}$$

$$n = \frac{1000 \times 60 \times v_c}{D \times \pi}$$

$$s = \frac{s_z \times n \times z}{1000}$$

Here are some useful formulas to help you calculate the correct number of teeth on saw blades:

$$t = \frac{h \times 1,45}{k}$$

$$z = \frac{D \times \pi}{t}$$

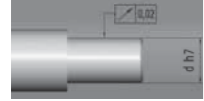
Key:

- t [mm] – tooth pitch
- h [mm] – thickness of the work piece
- k [-] – number of teeth in cutting place (2÷3)
- z [-] – number of teeth of the saw blade
- D [mm] – sawblade diameter

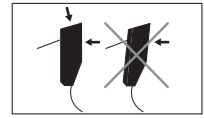


INSTRUCTIONS HOW TO USE SAW BLADES CORRECTLY

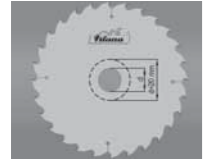
We recommend to follow the below rules in order to reach the best cutting results:



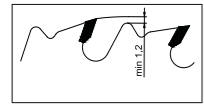
Pict. no. 2



Pict. no. 3



Pict. no. 4



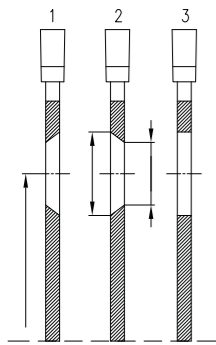
Pict. no. 5

- Machine must be in good condition without vibrations

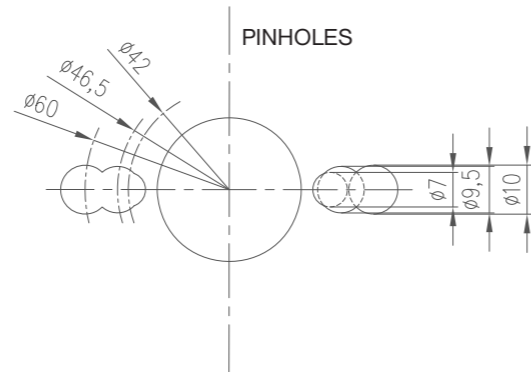
Recommended Diameters for Flange

Diameter of Saw Blade (mm)	200	250 - 300	350 - 450	500 - 700
Flange Diameter (mm)	70	80 - 100	100 - 140	140 - 160

- Flanges must be clean and it is important to check their side run - out
- Check the spindle of the machine. It must be absolutely straight (picture 2)
- Tips must always be sharpened with the original angles
- See the most appropriate way of sharpening (picture 3)
- If rebored by over 20mm, the blade loses its original features and its stability (picture 4)
- In saw blades with chip limiter, it is necessary to grind the TCT and the chip limiter to keep the oversize of the TCT (picture 5)



- TYPE 1
Countersink right
- TYPE 2
Countersink left
- TYPE 3
Pinhole without countersink



FREQUENTLY ASKED QUESTIONS

WHAT CAN I DO TO OBTAIN BETTER CUTTING SURFACE FINISH?	Choose saw blade with more teeth
	Use higher peripheral speed
	Select saw blade with different tooth shape
	Check flanges and distances
	Check condition of spindle bearing
BLADE IS VERY NOISY, ESPECIALLY WHEN IDLING, WHY?	Blade goes into oscillation (self-vibration)
	Change number of teeth and diameter
	Adjust speed of revolutions if possible
	Choose sound absorbing saw blade
HOW TO AVOID CHIPPING OUT ON THE BOTTOM SIDE OF THE MATERIAL?	A coating of sound absorbing material on the inside of the safety cover.
	Use saw blade with more teeth
	Saw blade is positioned too high above cutting material
WHY DOES SAW BLADE WOBBLE WHEN WARM?	Choose different tooth shape and angles
	During cutting saw blade becomes warm, especially on the periphery, which causes its expansion and stretching. Adding expansion slots improves blade's properties
HOW TO AVOID BLADE CHOPPING WHEN CUTTING ALUMINIUM?	When using manual feed, negative hook angle results in softer cut, saw blade with more teeth also results in softer cutting edge
	Positive hook angle is used in automatic feed, saw blade with more teeth results in softer cutting edge

TROUBLESHOOTING CHART

Problem	Possible cause	Action
Saw blade wobbles	Thickness of the tool body is too small	Select saw blade with large kerf or smaller diameter or increase flange diameter
	Insufficient tooth projection over tool body (saw blade jams in the cut, runs hot, tension lost)	Select saw blade with higher lateral tooth projection
	Resin/chips on the flanges	Clean flanges
	Flange run out tolerance too high	Check and correct flange
	Defective motor spindle bearing	Replace motor spindle bearing
	Tooth pitch and gullet too small	Select saw blade with higher tooth pitch
	Unbalanced saw blade	Balance saw blade
	Blunt cutting edges	Resharpen saw blade
	Wrong saw blade tensioning	Correct saw blade tensioning
Wavy cut	Irregular tooth pitch or one sided cut	Correct sharpening machine adjustment, resharpen saw blade
	Irregular tooth thickness	Check and correct saw blade kerf
	Saw blade is blunt, resin build up	Clean and resharpen saw blade
	Position of fence not parallel to feed direction	Check and adjust position
	One sided load from edge cutting	Use edging saw blade (hogger)
	Cutting speed too low	Select larger saw blade diameter or increase RPM
	Wrong saw blade tensioning	Correct saw blade with larger gullet
Jamming of saw blade when cutting	Slot in saw bed is too thin, insufficient chip outflow	Replace/widen saw bed
	Riving knife width is too thin	Replace riving knife
	Gullet too small	Choose saw blade with larger gullet
Curved cut when double edging	Saw blade's sharpening is one sided	Resharpen kerf of saw blade
	Resin and glue on rollers	Clean and resharpen rollers
	Differences in wood thickness	Improvements necessary at customer
	Too high cutting forces on one side	Optimize cutting force division
	Worn conveyor belt guide	Check and adjust chain guide
	Short and uneven workpieces	Comply with minimum workpiece length required by the machine manufacturer's instructions
Exceeded tolerances of horizontally cut lamellas	When machining piece by piece	Pay attention to angular cut off work pieces
	Sawblade tensioning not suitable for horizontal application	Check saw blade tensioning
	High resin build up on saw blade body, it runs very hot from friction in cut	Clean saw blade and check if blunt
Tear outs in workpieces coated on both sides when machining without scoring saw	Thickness and position of riving knife not adjusted to dimensions of strips and saw blade kerf	Use riving knife dimension matching saw blade kerf. Adjust riving knife spacing to correspond to thickness of strips
	Saw blade projection over workpiece too small or too big	Check and adjust saw blade protection
	Tooth shape or number of teeth not suitable for the application	Select saw blade suitable for the application
	Concentric running tolerances of saw blade too high	Have saw blade checked by PILANA service
Tear outs on panel coating when cutting in stacks	Flange used on machine does not correspond to guidelines for flange diameter and concentric running tolerances	Check flanges and clean them. If there is wrong ratio of saw blade diameter to flange diameter, adjust accordingly
	Tool is blunt	Resharpen main saw blade
Tear outs where tool leaves workpiece when cutting in stacks	Pressure beam cannot press evenly on uneven workpieces	Check pressing forces of pressure beam
	Kerf of scoring saw blade is too small for main saw blade in use	Adjust kerf of scoring saw blade to main saw blade accordingly

Symbol Index



tooth pitch in mm



euro pinholes



low noise slots



low noise slots



type of grade



type of grade



type of grade



side balance



side balance

