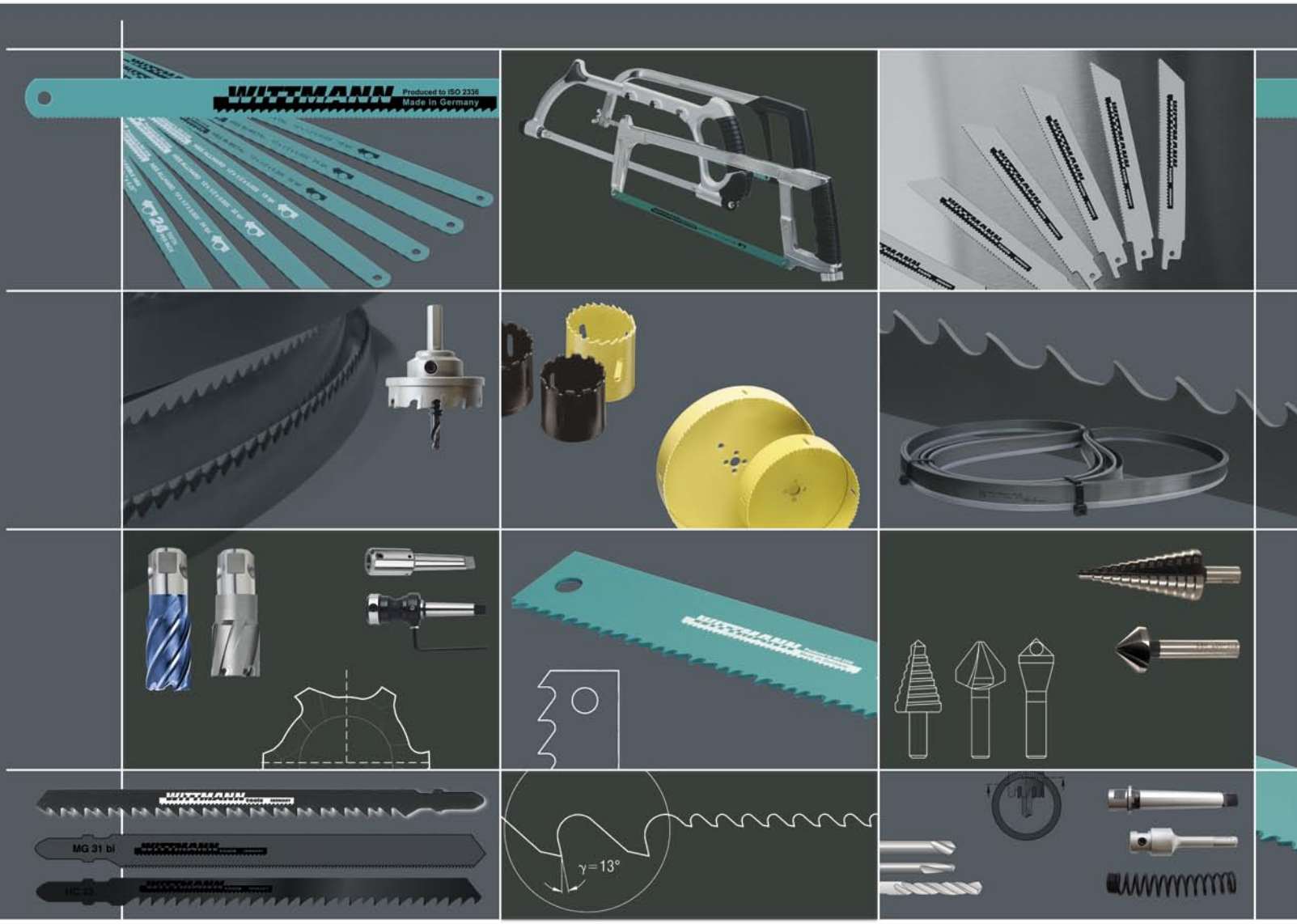
WITTMANN tools GERMANY

Catalogue 2005

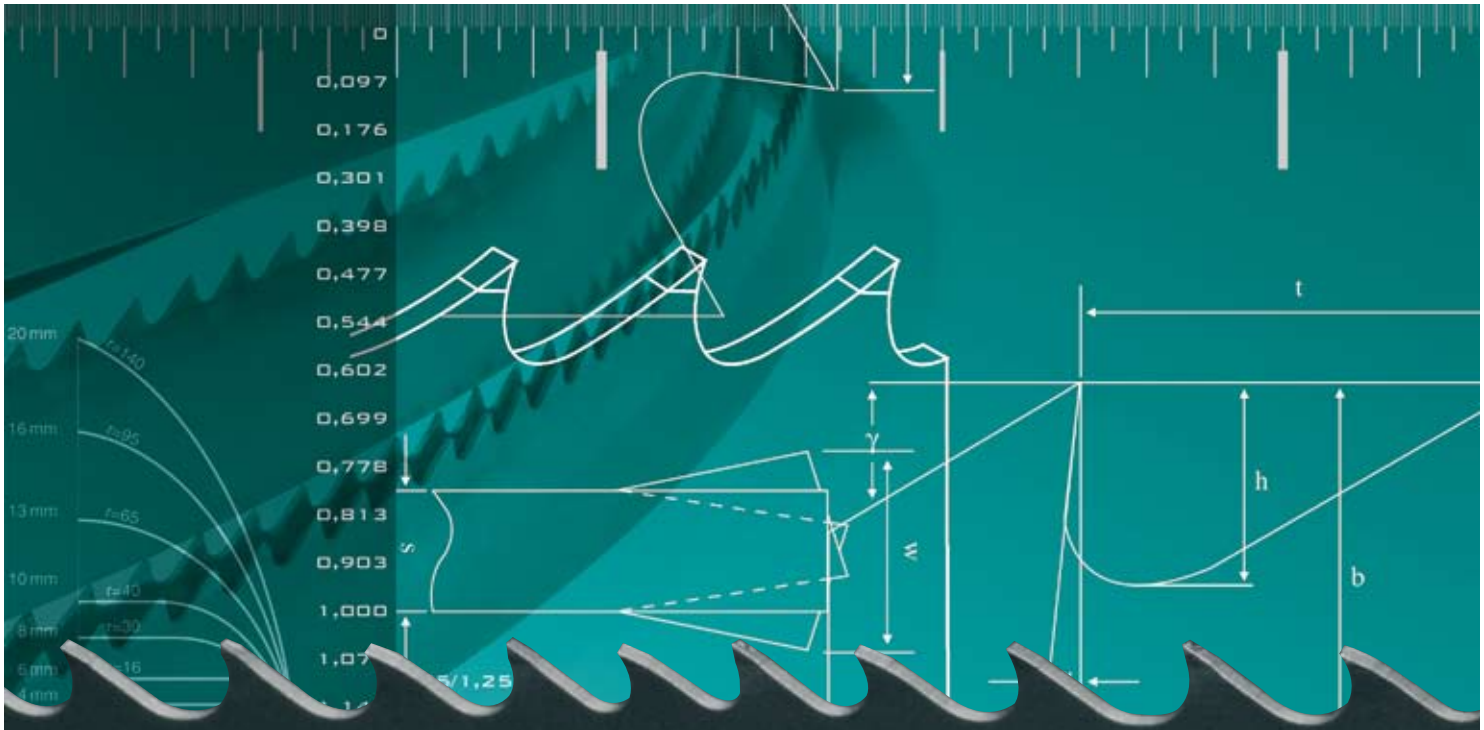


Content

E. Wittmann machines & tools
Gemeindeberg 2
34286 Spangenberg
Germany

Tel. 05663-930093
Fax 05663-930095
wittmann@wittmann-tools.com
www.wittmann-tools.com

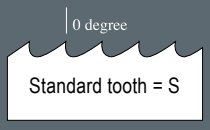
Wittmann-tools catalogue 11.2005



Band saw blade characteristics

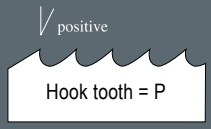
Tooth Forms — Where performs the right tooth?

Only correct choice of tooth forms allow efficient cutting with low vibration.
Four basic types are available:



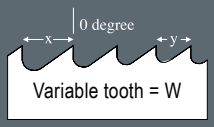
Designed for:
- short chipping materials
- light wall thickness

Data:
- rake angle 0°
- 3 to 18 tpi



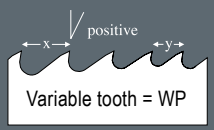
Designed for:
- long chipping materials
- large cross sections

Data:
- positive rake angle
- 0.75 to 6 tpi



Designed for:
- low vibration cutting
- structuals

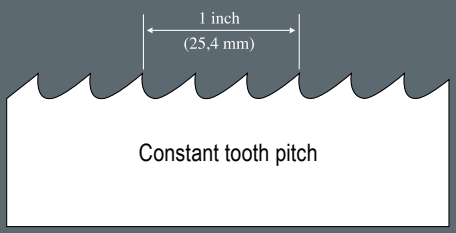
Data:
- rake angle 0°
- variable tooth pitch of 3/4 to 10/14 tpi



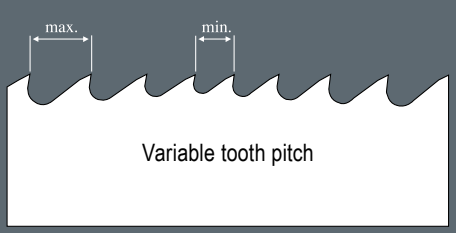
Designed for:
- low vibration cutting
- solid materials

Data:
- positive rake angle
- variable tooth pitch of 0.55/0.75 to 4/6 tpi

Tooth Pitch — Constant or variable?



The tooth distance is equally spaced.
The number of teeth per inch (25.4 mm) denotes the tooth of the saw blade.



The tooth distances vary within a group of teeth.
The smallest and largest tooth pitch denotes the variable tooth of the saw blade.

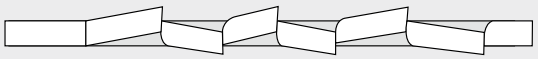
Tooth Set — What groups and waves can cause.

Apart from tooth pitch and tooth form the exact set is essantial for the performance of the sawblade. The correct clearance of back is achieved by the specific set for the cutting application. This is to avoid blade pinching, very important in problematic cutting jobs. Width and type of set are tuned to the cutting application:

Standard-Raker-Set (S, SW)
up to 10 tpi
Tooth forms S, P

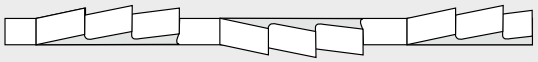
Standard-Raker-Set

Variable-group-set (G, GW)
0.75/1.25 to 10/14 tpi
Tooth form WP, W



Variable-group-set

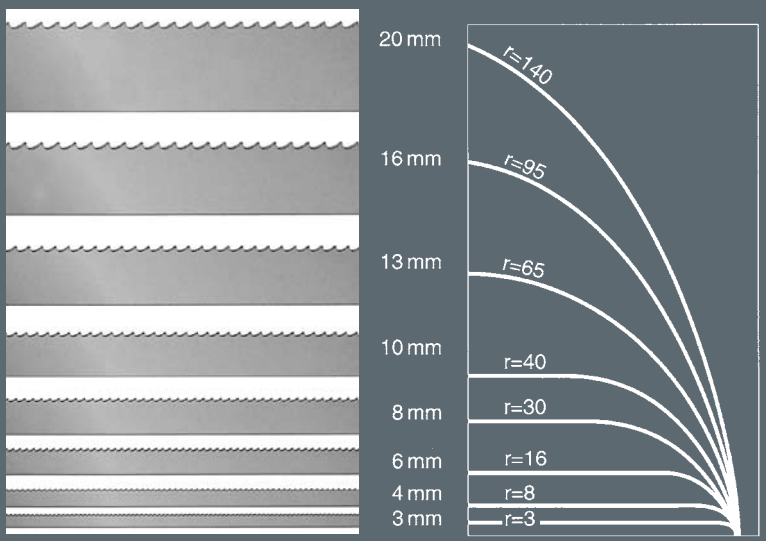
Wavy set (W)
14 to 32 tpi and above
Tooth form S



Wavy set

Band Width

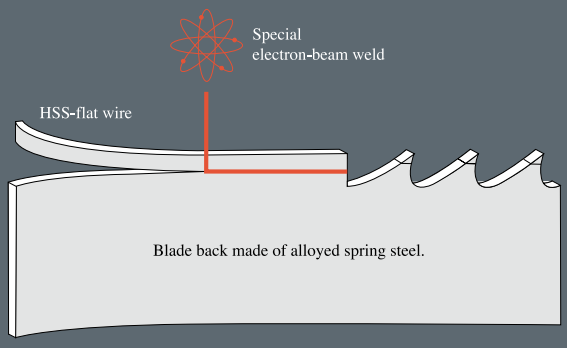
This is the mesurement from the tip of the tooth to the back of the blade. The selection of blade is conditioned by the mechanical saw itself. It is recommended to use the maximum width permitted by the machine in order to achieve maximum stability and equilibrium of forces. In cutting contours, the band width is conditioned by the radii. The relationship between widths and radii is established in the RADII TABLE.



Bi-Metal — Why so successful?

M 42
material no. 1.3247
hardness approx. 67-69 HRC

M 51
material no. 1.3207
hardness approx. 69 HRC, with high tungsten- and cobalt content



Flexible:
The blade back of our Bi-Metal band saw blade consists of a special alloyed spring steel. Highly flexible at a hardness of about 50 HRC. The ideal basis for long fatique life and excellent cutting performance.

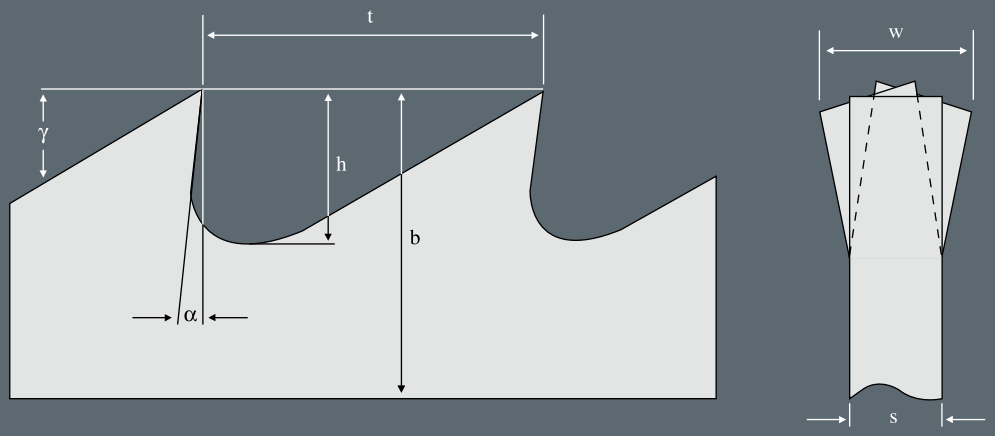
Hard and wear resistant:
Tooth tips made of hardened HSS Steel in M 42 or M 51 quality.

Perfectly joint:
Both materials are undetachably welded together.

All advantages:
The high quality Bi-Metal band combines the flexibility of the spring steel backing with enormeous wear resistance of high-speed steel. Each tooth tip is of hardened HSS-steel, extremely durable for best performance.

Band Saw Geometry

b width of blade
s thickness of saw blade
h gullet depth
t tooth pitch
α rake angle
γ clearance angle
w width of set



Correct tooth pitch - optimum performance

Recommendation to cut solid material

The choice of the right tooth pitch can be decisive to achieve the optimum performance to cut the relevant cross section. Choose either Standard tooth with constant tooth pitch or Variable tooth with unevenly spaced teeth. It is advisable to use Variable tooth to cut problematic workpieces to reduce vibrations.

Constant Tooth Pitch			Variable Tooth Pitch		
cross section	teeth per inch		cross section	teeth per inch	
mm	tpi	tooth shape	mm	tpi	tooth shape
up 750	0.75	K	up 550	0.75/1.25	WP
380-800	1.25	K	300-600	1/2	WP
200-400	2	K	120-350	2/3	WP
120-200	3	K, S	80-140	3/4	WP
80-120	4	K, S	60-110	4/6	WP
50-80	6	S	40-70	5/8	W
30-50	8	S	30-60	6/10	W
20-30	10	S	20-40	8/12	W
10-20	14	S	to 25	10/14	W
to 10	18	S			

S = Standard tooth, K = Hook tooth, WP = positive rake angle , W = rake angle 0°

Recommendation to cut tubes and structurals

The choice of the right tooth has special influence on the cutting result on tubes and structurals. Variable tooth has proven to be the most favourable tooth form. Tooth pitches selected are depending on wall thickness and outer dimensions of tubes or structurals.
The recommendation shown here refer to single cuts. If two or more tubes or square pipes are cut at a time, double wall thickness to select tooth pitch.

Thin wall structurals (0° rake angle)

Wall thickness (S) in mm	Diam. of structural (D) in mm 20	40	60	80	100	120	150
2	14	14	14	14	14	14	10/14
3	14	14	14	14	10/14	10/14	8/12
4	14	14	10/14	10/14	8/12	8/12	6/10
5	14	10/14	10/14	8/12	8/12	6/10	6/10
6	14	10/14	8/12	8/12	6/10	6/10	5/8
8	14	8/12	6/10	6/10	5/8	5/8	5/8
10	-	6/10	6/10	5/8	5/8	5/8	-

Heavy wall structurals (pos. rake angle)

Wall thickness (S) in mm	Diam. of structural (D) in mm 80	100	120	150	200	300	500	750
10	-	-	-	4/6	4/6	4/6	3/4	3/4
15	4/6	4/6	4/6	4/6	3/4	3/4	2/3	2/3
20	4/6	3/4	3/4	3/4	3/4	2/3	2/3	2/3
30	3/4	3/4	3/4	3/4	2/3	2/3	2/3	1/2
50	-	3/4	3/4	2/3	2/3	2/3	1/2	1/2
80	-	-	-	-	2/3	1/2	1/2	1/2
100	-	-	-	-	-	1/2	0.75/1.25	0.75/1.25

Produce best chip load with the right feed-rate.

Only the perfect relation between feed rate and cutting speed provides ideal chip formation and productive cutting operation. The feed rate, converted to cutting rate (Ps in cm²/min) is calculated acc. to the following formula:

$$P_s max. = V_c(1.54 – 1.13 \times lg\ tpi)$$

$P_s max.$ = maximum cutting rate (cm²/min)
V_c = cutting speed (m/min)
lg.-tpi. = logarithm of toothing (tpi)

The exercise factor – short cutting times.

To evaluate calculated data for daily practic,
cutting rates can be converted into cutting times.

$$t_h = \frac{S}{P_s}$$

t_h = cutting time (min)
S = cut surface (cm²)
P_s = cutting rate (cm²/min)

Tpi	Logarithm
0.75/1.25	0
1.25	0.097
1/2 (1.5)	0.176
2	0.301
2/3 (2.5)	0.398
3	0.477
3/4 (3.5)	0.544
4	0.602
4/6 (5.0)	0.699
6	0.778
5/8 (6.5)	0.813
8 + 6/10	0.903
10 + 8/12	1.000
10/14 (12.0)	1.079
14	1.146

Break-in procedures: For long blade life.

For extended blade life, less blade changes and best payback of your tool cost, special break-in procedures should be adhered to.

Overload of the razor-sharp tooth tips should be avoided at the start of cutting operation.
Aggressive cutting with a new blade lead to premature tooth breakages. Correct break-in will control the gentle rounding of cutting edges.

Starting feed should half of final speed rate at the recommended cutting speed for the first 300 – 500 cm² cut surface. After that, feed rate should be gradually increased for maximum cutting rate as mentioned above.

Should vibrations or noises occur at the beginning of the cutting operation, cutting speed should slightly be adjusted.

All Metal Band Saw Blades are supplied as:

- endless welded loops, suitable for your band saw machine
- coils of 30.5/50/100 m
- in production lengths of 50–110 m, depending on band saw sizes

Technical Recommendations

Material Groups	Material	Material-No.	Cutting Speed V_c(m/min)		Cooling Fluids	
	Specification DIN		Carbon	Bi-Metal	Cutting oil	Emulsion
Structural steels	St 37 - 2	1.0037	30 - 50	80 - 100		x
	St 50 - 2	1.0050	30 - 45	60 - 85		x
	St 60 - 2	1.0060	30 - 40	50 - 70		x
Case-hardening steels	C 10	1.0301	40 - 60	80 - 100	x	
	14 NiCr 14	1.5752	25 - 30	40 - 55	x	
	21 NiCrMo 2	1.6523	30 - 40	50 - 60	x	
	16 MnCr 5	1.7131	25 - 30	40 - 60	x	
Free-Machining steels	9 S 20	1.0711	40 - 60	80 - 120		x
	45 S 20	1.0727	40 - 60	80 - 120		x
Heat treatable steels	C 45	1.0503	35 - 50	60 - 70		x
	40 Mn 4	1.1157	30 - 40	60 - 70		x
	36 NiCr 6	1.5710	30 - 40	60 - 70		x
	34 CrNiMo 6	1.6582	25 - 35	50 - 65		x
	42 CrMo 4	1.7225	25 - 35	50 - 65		x
Ball bearing steels	100 Cr 6	1.3505	20 - 30	35 - 50		x
	100 CrMn 6	1.3520	20 - 30	35 - 50		x
Spring steels	65 Si 7	1.5028	25 - 35	45 - 60		x
	50 CrV 4	1.8159	25 - 35	45 - 60		x
Unalloyed tool steels	C 125 W	1.1663	20 - 30	40 - 60		x
	C 75 W	1.1750	20 - 30	40 - 60		x
Cold-Work tool steels	125 Cr 1	1.2002	20 - 30	40 - 50	x	x
	X 210 Cr 12	1.2080	15 - 25	30 - 40	x	x
	X 155 CrVMo 12 1	1.2379	15 - 25	30 - 40	dry	x
	X 42 Cr 13	1.2083	20 - 25	35 - 45	x	x
	X 165 CrV 12	1.2201	15 - 25	30 - 45	x	x
	100 CrMo 5	1.2303	15 - 30	30 - 50	x	x
	X 32 CrMoV 3 3	1.2365	25 - 35	45 - 60	x	x
	45 WCrV 7	1.2542	20 - 30	40 - 50	x	x
Hot-Work tool steels	56 NiCrMoV 7	1.2714	20 - 30	40 - 50	x	x
High-speed steels	S 6-5-2-5 (E Mo5 Co5)	1.3243	20 - 30	35 - 45		x
	S 2-10-1-8 (M 42)	1.3247	20 - 30	35 - 45		x
	S 6-5-2 (DMo5)	1.3343	20 - 30	35 - 45		x
Valve Steels	X 45 CrSi 9 3	1.4718	-	30 - 45	x	x
	X 45 CrNiW 18 9	1.4873	-	30 - 40	x	x
High temperature steels	X 20 Cr MoV 12 1	1.4922	-	10 - 30	x	x
	X 5 NiCrTi 26 15	1.4980	-	10 - 30	x	x
Heat resistant steels	X 10 CrSi 6	1.4712	-	15 - 25	x	x
	X 10 CrAl 18	1.4742	-	15 - 25	x	
	X 15 CrNiSi 25 20	1.4841	-	15 - 25	x	
Stainless steels	X 5 CrNi 18 10	1.4301	-	30 - 40	x	x
	X 6 CrNiMoTi 17 12 2	1.4571	-	30 - 40	x	x
Steel castings	GS-38	1.0420	20 - 30	40 - 60		x
	GS-60	1.0558	20 - 30	40 - 60		x
Cast irons	GG-15	0.6015	25 - 30	30 - 60	dry	
	GG-30	0.6030	25 - 30	30 - 60	dry	
	GGG-50	0.7050	25 - 30	30 - 60	dry	
	GTW-40-05	0.8040	25 - 30	30 - 60	dry	
	GTS-65-02	0.8165	25 - 30	30 - 60	dry	
Copper	KE-Cu	2.0050	100 - 250	100 - 400	x	x
	elektrolyte-copper		100 - 250	100 - 400	x	x
Brass (Copper-Zinc Alloys)	CuZn 10	2.0230	100 - 300	100 - 400		x
	CuZn 31 Si 1	2.0490	100 - 250	100 - 400		x
Aluminium Bronze (Copper-Aluminium Alloys)	CuAl 8	2.0920	20 - 30	35 - 50		x
	CuAl 10 Fe 3 Mn 2	2.0936	20 - 30	35 - 50		x
Bronze (Copper-Tin Alloys)	CuSn 6	2.1020	80 - 100	80 - 150		x
	CuSn 6 Zn 6	2.1080	80 - 100	80 - 150		x
Red Brass (Copper-Cast Alloys)	G-CuSn 10 Zn	2.1086.01	30 - 40	50 - 100		x
	G-CuSn 5 ZnPb	2.1096.01	30 - 40	50 - 100		x
Nickel Base Alloys	NiCr 20 TiAl	2.4631	-	10 - 25	x	x
	NiCr 22 FeMo	2.4972	-	10 - 25	x	x
Aluminium and Alloys	Al 99.5	3.0255.07	80 - 300	80 - 800		x
	AlMgSiPb	3.0615.71	80 - 300	80 - 800		x
	G-AlSi 5 Mg	3.2341.01	80 - 300	80 - 800		x
Titanium Alloys	Ti 99.5	3.7024.1	-	10 - 20	x	x
	TiAl 6 V 4	3.7165	-	10 - 20	x	x
Thermoplastic Plastics	PVC		100 - 400	100 - 400	dry	
	Teflon, Hostalen		100 - 400	100 - 400	dry	
Plastics with fibre inlays	Resitex		50 - 200	50 - 300	dry	
	Novotex		50 - 200	50 - 300	dry	

Bi-Metal Band saw blade

Combine the highest cutting efficiency with incredible durability.

The teeth, in cobalt high-speed steel (M42), tempered to 67-69 HRc.

Suitable for large-lot production.

Suitable for a wide selection of materials like steels above 1200 N/mm² and stainless steels up to difficult to cut materials.

Supplied in coils of 100 ft (30.5 m), 250 ft (76 m), 328 ft (100 m) production coils, or in endless welded bands.

Special M42-Co8-W

All purpose blade for material dimensions from 20 to 80 mm maximal contact lenght. Variable tooth pitch - rake angle 0°.

SPECIAL

Engineered for:
- profiles and solid materials
- all steels up to 45° HRc
- demanding workshop operations

Superior, because:
Cost reduced by using 3% Cr-Backer and optimised producing program.
For general purpose up to 45° Rockwell materials.

Ref.	Dimension (mm)	Teeth per Inch
B.SP-Co8-W-20	20 x 0.90	5/8; 6/10; 8/12; 10/14
B.SP-Co8-W-27	27 x 0.90	5/8; 6/10; 8/12; 10/14
B.SP-Co8-W-34	34 x 1.10	5/8; 6/10; 8/12
B.SP-Co8-W-41	41 x 1.30	

Special M42-Co8-WP

All purpose blade for material dimensions from 50 to 350 mm maximal contact lenght. Variable tooth pitch - rake angle 10° positive.

SPECIAL

Engineered for:
- profiles and solid materials
- all steels up to 45° HRc
- demanding workshop operations

Superior, because:
Cost reduced by using 3% Cr-Backer and optimised producing program.

Ref.	Dimension (mm)	Teeth per Inch
B.SP-Co8-WP-20	20 x 0.90	4/6
B.SP-Co8-WP-27	27 x 0.90	3/4; 4/6
B.SP-Co8-WP-34	34 x 1.10	2/3; 3/4; 4/6
B.SP-Co8-WP-41	41 x 1.30	2/3; 3/4; 4/6

HSS Bi-M42 ALUCUT

SPECIAL

Easy cuts in light metals.
Hook (P); 10° positive rake angle, extra wide set

Engineered for:
- pure aluminium and aluminium alloys
- all dimensions

Superior, because:
Tooth tips made of HSS M42 / material no. 1.3247. The positive hook tooth with an extra heavy set performs at all dimensions. Smooth cuts and tool life that convinces.

Ref.	Dimension (mm)	Teeth per inch
B.Co8-PALU-20	20 x 0.90	3 4
B.Co8-PALU-27	27 x 0.90	3 4
B.Co8-PALU-34	34 x 1.10	3

HSS Bi-M42-PROFIL

PREMIUM

Outstanding performance for Heavy Fabricators.
Variable tooth; 6° rake angle, extra wide set

Engineered for:
- beams
- layer and bundle cuts
- hollow profiles
- angle profiles

Superior, because:
Tooth tips made of HSS M42 / materials no. 1.3247. The variable tooth with slightly positive rake angle and extra heavy group-set shows excellent performance on H-beams and similar shapes.
The Bi-HSS-M42-PROFIL avoids blade pinching in beams with inside tension, or in poorly supported profiles.
For 90° and miter cutting.

Ref.	Dimension (mm)	Teeth per Inch
B.Co8-PRO 20	20 x 0.90	5/7; 8/11
B.Co8-PRO 27	27 x 0.90	3/4; 5/7; 8/11
B.Co8-PRO 34	34 x 1.10	2/3; 3/4; 5/7; 8/11
B.Co8-PRO 41	41 x 1.30	2/3; 3/4; 5/7; 8/11
B.Co8-PRO 54	54 x 1.30	2/3; 3/4; 5/7
B.Co8-PRO 55	54 x 1.60	2/3; 3/4; 5/7

HSS Bi-M42 Co8-S

PREMIUM

All purpose blade for small dimension solid steel.
Standard teeth (S); 0° rake angle

Engineered for:
- common steel qualities up to 1400 N/mm² tensile strength
- non ferrous metals
- cross sections up to approx. 100 mm (4 inch)
- contour cutting operations

Superior, because:
Tooth tips of HSS M42 / material no. 1.3247. The standard tooth with 0° resp. slightly positive rake angle combined with a standard-raker or wavy set is distinguished to cut short chipping materials and light wall thicknesses. For smooth and burr-free cuts.

Ref.	Dimension (mm)	Teeth per inch
B.Co8-S 04	4 x 0.90	10 14
B.Co8-S 05	6 x 0.65	14
B.Co8-S 06	6 x 0.90	10 14
B.Co8-S 10	10 x 0.90	8 10 14
B.Co8-S 12	13 x 0.50	14
B.Co8-S 13	13 x 0.65	10 14 18
B.Co8-S 14	13 x 0.90	6 8 10 14
B.Co8-S 20	20 x 0.90	4 6 8 10 14 18
B.Co8-S 27	27 x 0.90	3 4 6 8 10 14 18
B.Co8-S 28	27 x 1.10	4 6
B.Co8-S 34	34 x 1.10	3 4 6 8 10 14
B.Co8-S 41	41 x 1.30	3 4 6

HSS Bi-M42 Co8-W

The Structural-Professional blade for efficient cutting on manual machines. Variable tooth pitch, 0° rake angle, BEST SELLER

PREMIUM

Engineered for:
- common steel qualities up to 1400 N/mm² tensile strength
- non ferrous structurals
- single and bundle cuts
- tubes and structurals with light or medium walls
- sheet metal on vertical band saw machines

Superior, because:
Tooth tips of HSS M42 / material no. 1.3247. The variable tooth with 0° rake angle with a special groupset cuts even lightest sections with less vibrations. Short chipping materials are cut without a problem. The Bi-HSS-M42-Co8-W band for long life and low cost cutting.

Ref.	Dimension (mm)	Teeth per inch
B.Co8-W 05	6 x 0.65	6/10; 10/14
B.Co8-W 06	6 x 0.90	10/14
B.Co8-W 10	10 x 0.90	10/14
B.Co8-W 12	13 x 0.50	8/12; 10/14
B.Co8-W 13	13 x 0.65	6/10; 8/12; 10/14
B.Co8-W 14	13 x 0.90	6/10; 8/12; 10/14
B.Co8-W 20	20 x 0.90	4/6; 5/8; 6/10; 8/12; 10/14
B.Co8-W 27	27 x 0.90	3/4; 4/6; 5/8; 6/10; 8/12; 10/14
B.Co8-W 28	27 x 1.10	4/6
B.Co8-W 34	34 x 1.10	3/4; 4/6; 5/8; 6/10; 8/12
B.Co8-W 41	41 x 1.30	3/4; 4/6; 5/8; 6/10
B.Co8-W 54	54 x 1.30	4/6; 6/10

HSS Bi-M42 Co8-P10

The most various blade. Hook tooth with 10° positive rake angle.

PREMIUM

Engineered for:
- all steels up to 45° HRc
- all workpiece dimensions
- non-ferrous metals
- contour cuts

Superior, because:
Tooth tips of HSS M42. The positive hook tooth in combination with raker set is warrenty for the most efficient cut in long chip solid material.

Ref.	Dimension (mm)	Teeth per inch
B.Co8-P10-05	6 x 0.65	6
B.Co8-P10-06	6 x 0.90	4 6
B.Co8-P10-10	10 x 0.90	4 6
B.Co8-P10-13	13 x 0.65	4 6
B.Co8-P10-14	13 x 0.90	3 4 6
B.Co8-P10-20	20 x 0.90	3 4 6
B.Co8-P10-27	27 x 0.90	2 3 4 6
B.Co8-P10-28	27 x 1.10	2 3
B.Co8-P10-34	34 x 1.10	1.25 2 3 4
B.Co8-P10-41	41 x 1.30	1.25 2 3 4
B.Co8-P10-54	54 x 1.30	1.25 2 3
B.Co8-P10-55	54 x 1.60	1.25 2 3
B.Co8-P10-67	67 x 1.60	0.75 1.25 2 3
B.Co8-P10-80	80 x 1.60	0.75 1.25

HSS Bi-M42 Co8-WP10

Most efficient blade for production operation cutting. Variable tooth pitch, 10° positive angle, BEST SELLER

PREMIUM

Engineered for:
- common steel qualities up to 1400 N/mm² tensile strength
- non ferrous metals
- single and bundle cuts
- solid material of medium to large dimensions
- heavy wall tubes
- large construction steel
- large-dimensioned work pieces

Superior, because:
Tooth tips made of HSS M42 / material no. 1.3247. The variable tooth with a positive rake angle with a special group-set cuts solid materials as well as heavy wall structurals and tubing at fast cutting rates, with a smooth surface.

Ref.	Dimension (mm)	Teeth per inch
B.Co8-WP10-27	27 x 0.90	2/3 3/4 4/5 4/6
B.Co8-WP10-28	27 x 1.10	2/3 3/4 4/6
B.Co8-WP10-34	34 x 1.10	1.4/2 2/3 3/4 4/5 4/6
B.Co8-WP10-41	41 x 1.30	1.4/2 2/3 3/4 4/5 4/6
B.Co8-WP10-54	54 x 1.30	0.75/1.25 1.4/2 2/3 3/4 4/5 4/6
B.Co8-WP10-55	54 x 1.60	1.4/2 2/3 3/4 4/5 4/6
B.Co8-WP10-67	67 x 1.60	0.75/1.25 1.4/2 2/3 3/4 4/6
B.Co8-WP10-80	80 x 1.60	0.75/1.25 1.4/2 2/3 3/4
B.Co8-WP10-125	125 x 2.00	0.75/1.25

HSS Bi-M42 Co8-WP16

Most aggressive cutting M42 blade.
Variable tooth pitch, 16° positive angle.

PREMIUM

Engineered for:
- long chipping steels
- stainless steels
- titanium base alloys
- special bronze
- copper alloys
- nickel base alloys
- exotic, difficult to cut alloys
- solid material of medium sections

Superior, because:
Tooth tips of HSS M42. The extra positive variable hook-teeth form in combination with group set teeth is warrenty for the most efficient cut in rust and acid-resistant steels and exotic alloys.

Ref.	Dimension (mm)	Teeth per inch				
B.Co8-WP16-27	27 x 0.90				2/3;	3/4
B.Co8-WP16-34	34 x 1.10				2/3;	3/4
B.Co8-WP16-41	41 x 1.30			1.4/2	2/3;	3/4
B.Co8-WP16-54	54 x 1.30			1.4/2	2/3;	3/4
B.Co8-WP16-55	54 x 1.60		0.75/1.25	1.4/2	2/3;	3/4
B.Co8-WP16-67	67 x 1.60	0.55/0.75		1.4/2	2/3;	3/4
B.Co8-WP16-80	80 x 1.60	0.55/0.75		1.4/2	2/3;	3/4
B.Co8-WP16-100	100 x 1.60		0.75/1.25			

HSS Bi-M42 BIGDIM-H

NEW DESIGN blade for BIG DIMensions. New developed tooth design in combination with a special setting is the warrenty of an optimum in cutting performance and tool life.

PREMIUM

Engineered for:
- rust and acid-resistant steels
- steels with high tensile strenght
- nickel base alloys
- brittle and annealed materials
- short-chipping materials

Superior, because:
The combination of tooth design and setting allow user to cut big dimension material in a short time for a low cost price.

Ref.	Dimension (mm)	Teeth per inch			
B.Co8-BIGDIM-H-34	34 x 1.10			2/3	3/4
B.Co8-BIGDIM-H-41	41 x 1.30			2/3	3/4
B.Co8-BIGDIM-H-54	54 x 1.30			2/3	3/4
B.Co8-BIGDIM-H-55	54 x 1.60	0.75/1.25	1.4/2	2/3	3/4
B.Co8-BIGDIM-H-67	67 x 1.60	0.75/1.25	1.4/2		
B.Co8-BIGDIM-H-80	80 x 1.60	0.75/1.25	1.4/2		

Also available as M 51. Surcharge 15% to price per meter.

HSS Bi-M42 BIGDIM-V

NEW DESIGN blade for BIG DIMensions. New developed tooth design in combination with a special setting is the warrenty of an optimum in cutting performance and tool life.

PREMIUM

Engineered for:
- rust and acid-resistant steels
- steels with high tensile strenght
- nickel base alloys
- long-chipping materials
- tough materials

Superior, because:
The combination of tooth design and setting allow user to cut big dimension material in a short time at a low cost price.

Ref.	Dimension (mm)	Teeth per inch			
B.Co8-BIGDIM-V-34	34 x 1.10			2/3	3/4
B.Co8-BIGDIM-V-41	41 x 1.30			2/3	3/4
B.Co8-BIGDIM-V-54	54 x 1.30			2/3	3/4
B.Co8-BIGDIM-V-55	54 x 1.60	0.75/1.25	1.4/2	2/3	3/4
B.Co8-BIGDIM-V-67	67 x 1.60	0.75/1.25	1.4/2		
B.Co8-BIGDIM-V-80	80 x 1.60	0.75/1.25	1.4/2		

Also available as M 51.

HSS Bi-M42 Co8-WEP16TOP

Top - high performance blade with borazon-ground tooth, 16° positive rake angle and special setting geometry.

PREMIUM

Engineered for:
- rust and acid-resistant steels
- titanium alloys
- nickel base alloys
- large work pieces
- high tensile strength steels

Superior, because:
The best accurancy cutting finish with a bi-metal M42 blade you can get.
Because of the optimum in chip division (trapeze tooth form) in combination with extreme positive tooth design the fastest cut you can do with a bi-metal M42 blade.

Ref.	Dimension (mm)	Teeth per inch				
B.Co8-WEP16TOP 27	27 x 0.90					3/4
B.Co8-WEP16TOP 34	34 x 1.10				2/3	3/4
B.Co8-WEP16TOP 41	41 x 1.30			1.4/2	2/3	3/4
B.Co8-WEP16TOP 54	54 x 1.30			1.4/2	2/3	
B.Co8-WEP16TOP 55	54 x 1.60	0.75/1.25		1.4/2	2/3	3/4
B.Co8-WEP16TOP 67	67 x 1.60	0.75/1.25		1.4/2	2/3	
B.Co8-WEP16TOP 80	80 x 1.60	0.75/1.25		1.4/2		

HSS Bi-M51 Co9W10-WP10

Extra wear resistant teeth for hard materials production cutting. Variable tooth pitch, 10° positive angle

PREMIUM

Engineered for:
- rust- and acid-resistant
- steels of medium and large bundle and profile dimensions
- nickel base alloys (Inconel, Hastelloy, Nimonic)
- titanium and special bronze materials
- steels up to 50° HRc.

Superior, because:
The best possible combination between 10° positive variable teeth, extrem hard M51 and the geometry of group set teeth allows to cut extreme steels at a low cost price.

Ref.	Dimension (mm)	Teeth per inch				
B.Co9W10-WP10-27	27 x 0.90				3/4	4/6
B.Co9W10-WP10-34	34 x 1.10		2/3		3/4	4/6
B.Co9W10-WP10-41	41 x 1.30	1.4/2	2/3		3/4	4/6
B.Co9W10-WP10-54	54 x 1.60	1.4/2	2/3		3/4	
B.Co9W10-WP10-67	67 x 1.60	1.4/2	2/3			
B.Co9W10-WP10-80	80 x 1.60	1.4/2				

HSS Bi-M51 Co9W10-WEPTOP

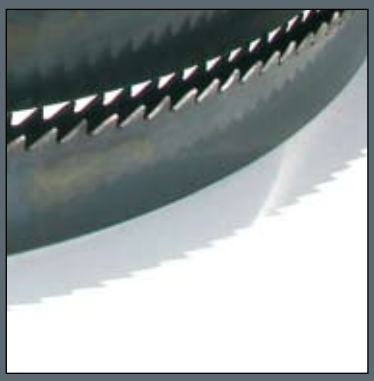
Extra wear resistant
Top - high performance blade with borazon-ground tooth, 16° positive rake angle and special setting geometry.

PREMIUM

Engineered for:
- rust- and acid-resistant
- steels of medium and large bundle and profile dimensions
- nickel base alloys (Inconel, Hastelloy, Nimonic)
- titanium and special bronze materials
- steels up to 50° HRc.

Superior, because:
The best accurancy cutting finish with a bi-metal M51 blade you can get.
Because of the optimum in chip division in combination with extreme positive tooth design the fastest cut you can do with a bi-metal M51 blade.

Ref.	Dimension (mm)	Teeth per inch				
B.Co9-W10-WEP-TOP 27	27 x 0.90					3/4
B.Co9-W10-WEP-TOP 34	34 x 1.10				2/3	3/4
B.Co9-W10-WEP-TOP 41	41 x 1.30			1.4/2	2/3	3/4
B.Co9-W10-WEP-TOP 54	54 x 1.30			1.4/2	2/3	
B.Co9-W10-WEP-TOP 55	54 x 1.60	0.75/1.25		1.4/2	2/3	3/4
B.Co9-W10-WEP-TOP 67	67 x 1.60	0.75/1.25		1.4/2	2/3	
B.Co9-W10-WEP-TOP 80	80 x 1.60	0.75/1.25		1.4/2		



Carbide Tipped Bandsaw Blades

The carbide tooth tips have a very exact tooth geometry.
Compared to HSS saw blades carbide tipped blades can stand a much higher cutting/ working temperature and therefore a much higher cutting speed and result in smoother cut edges.

Carbide tipped band saw blades are especially recommendable
- for cutting very hard and brittle materials, which can not be cut with Bi-Metal or HSS saws.
- for the cutting of all materials in order to raise cutting rates on existing machines.
- in order to reduce cost of the mechanical finishing of the cutting area.
- to use in production lines to reduce idle time during tool changes.

TCT-TITANIUM — To cut solid steels.

Engineered for:
- titanium
- stainless steels
- nickel base alloys
- heat resistant steels
- exotic, difficult to cut alloys

More dimensions in development (on request).

Superior, because:
Carbide tips welded to the blade back by latest technologies.
Carbide teeth precision ground in triple-chip geometry for fastest cutting rates at minimum vibration.

Ref.	Dimensions (mm)	inch	Variable tooth pitch 0.85/1.15	1.4/2	2/3	3/4	Constant tooth pitch 2	3
B.TCT-Ti 20	20 x 0.80	¾ x 0.032				x		x
B.TCT-Ti 27	27 x 0.90	1 1/16 x 0.035				x		x
B.TCT-Ti 34	34 x 1.10	1⅜ x 0.042			x	x	x	x
B.TCT-Ti 41	41 x 1.30	1⅝ x 0.050		x	x	x	x	x
B.TCT-Ti 54	54 x 1.30	2 ⅛ x 0.050	x	x	x			
B.TCT-Ti 55	54 x 1.60	2 ⅛ x 0.063	x	x	x			
B.TCT-Ti 67	67 x 1.60	2 ⅝ x 0.063	x	x	x			
B.TCT-Ti 80	80 x 1.60	3 ⅛ x 0.063	x	x				

TCT-ALUMINIUM — To cut non ferrous metals.

Engineered for:
- pure aluminium and alloys
- aluminium bronze and ampco
- copper and copper alloys
- brass
- sand contained aluminium and magnesium castings

Ref.	Dimensions (mm)	inch	Variable tooth pitch 0.85/1.15	1.4/2	2/3	3/4
B.TCT-AL 13	13 x 0.80	½ x 0.032				x
B.TCT-AL 20	20 x 0.80	¾ x 0.032				x
B.TCT-AL 27	27 x 0.90	1 1/16 x 0.035			x	x
B.TCT-AL 34	34 x 1.10	1⅜ x 0.042		x	x	x
B.TCT-AL 41	41 x 1.30	1⅝ x 0.050		x	x	x
B.TCT-AL 54	54 x 1.30	2 ⅛ x 0.050		x	x	
B.TCT-AL 55	54 x 1.60	2 ⅛ x 0.063	x	x	x	
B.TCT-AL 67	67 x 1.60	2 ⅝ x 0.063	x	x	x	
B.TCT-AL 80	80 x 1.60	3 ⅛ x 0.063	x	x		

TCT-GRIT on request.

Alloy Steel Bandsaw Blades

Alloy steel band saw blades are made from top quality carbon-steel with tempered teeth.

With flexible or hardened back they are used as economically priced alternative to bi-metal blades for cutting unalloyed steels, wood and plastics.

TUNGSTEN CARBON

- 2% tungsten steel alloy band saw blade, with tempered teeth and flexible back.
- Great durability.
- Due to the special characteristics of this tungsten steel and the delicacy of its welding, we recommend ordering bands in this quality welded to the desired length.
- Recommended for cutting of series and for harder materials requiring a blade that withstands higher cutting pressures or speeds.
- Supplied in coils of 100 ft (30.5 m), 250 ft (76 m), 328 ft (100 m) production coils, or in endless welded bands.

Regular teeth (S)

Ref.	Dimension (mm)	Teeth per inch
B.FB-T16N	16 x 0.80	4; 6; 8; 10; 14; 18; 22; 32
B.FB-T20N	20 x 0.80	4; 6; 8; 10; 14; 18; 22; 32
B.FB-T25N	25 x 0.90	3; 4; 6; 8; 10; 14; 18; 22; 32
B.FB-T32N	32 x 1.10	3; 4; 6; 8

Skip (A) & Hook teeth (P)

Ref.	Dimension (mm)	Teeth per inch A	P
B.FB-T16	16 x 0.80	4; 6	4; 6
B.FB-T20	20 x 0.80	4; 6	4; 6
B.FB-T25	25 x 0.90	4; 6	4; 6
B.FB-T32	32 x 1.10	4; 6	4; 6

CARBON FLEX BACK

- Carbon-steel band saw blade with high carbon content (1.25%), tempered teeth, flexible back, designed for solving normal cutting problems.
- Recommended for cutting alloy or non-alloy steels with hardness lower than 80 kg/mm².
- Supplied in coils of 100 ft (30.5 m), 250 ft (76 m), 328 ft (100 m) production coils, or in endless welded bands.

Also available for wood (wide set). Please order ref. number + „wood“.

Regular teeth (S)

Ref.	Dimension (mm)	Teeth per inch
B.RSS04N	4 x 0.63	10; 14; 18; 22; 32
B.RSS06N	6 x 0.63	8; 10; 14; 18; 22; 32
B.RSS08N	8 x 0.63	6; 8; 10; 14; 18; 22; 32
B.RSS10N	10 x 0.63	4; 6; 8; 10; 14; 18; 22; 32
B.RSS13N	13 x 0.63	4; 6; 8; 10; 14; 18; 22; 32
B.RSS15N	16 x 0.63	4; 6; 8; 10; 14; 18; 22; 32
B.RSS16N	16 x 0.80	4; 6; 8; 10; 14; 18; 22; 32
B.RSS20N	20 x 0.80	4; 6; 8; 10; 14; 18; 22; 32
B.RSS25N	25 x 0.90	3; 4; 6; 8; 10; 14; 18; 22; 32
B.RSS32N	32 x 1.10	3; 4; 6; 8

Skip (A) & Hook teeth (P)

Ref.	Dimension (mm)	Teeth per inch A	P
B.RSS04	4 x 0.63	4; 6	4; 6
B.RSS06	6 x 0.63	4; 6	4; 6
B.RSS08	8 x 0.63	4; 6	4; 6
B.RSS10	10 x 0.63	3; 4; 6	3; 4; 6
B.RSS13	13 x 0.63	3; 4; 6	3; 4; 6
B.RSS15	16 x 0.63	3; 4; 6	3; 4; 6
B.RSS16	16 x 0.80	3; 4; 6	3; 4; 6
B.RSS20	20 x 0.80	3; 4; 6	3; 4; 6
B.RSS25	25 x 0.90	3; 4; 6	3; 4; 6
B.RSS32	32 x 1.10	3; 4; 6	3; 4; 6

CARBON HARD BACK

- Carbon-steel band saw blade, with high carbon content (1.25%), tempered teeth and annealed back.
- Due to its special heat treatment, it is especially recommended for workshops or factories whose
- Specific cutting conditions cause higher than normal tensions in the band.
- Supplied in coils of 100 ft (30.5 m), 250 ft (76 m), 328 ft (100 m) production coils, or in endless welded bands.

Regular teeth (S)

Ref.	Dimension (mm)	Teeth per inch
B.HB03N	3 x 0.63	10; 14; 18; 22; 32
B.HB04N	4 x 0.63	8; 10; 14; 18; 22; 32
B.HB06N	6 x 0.63	6; 8; 10; 14; 18; 22; 32
B.HB08N	8 x 0.63	4; 6; 8; 10; 14; 18; 22; 32
B.HB10N	10 x 0.63	4; 6; 8; 10; 14; 18; 22; 32
B.HB13N	13 x 0.63	4; 6; 8; 10; 14; 18; 22; 32

Skip (A) & Hook teeth (P)

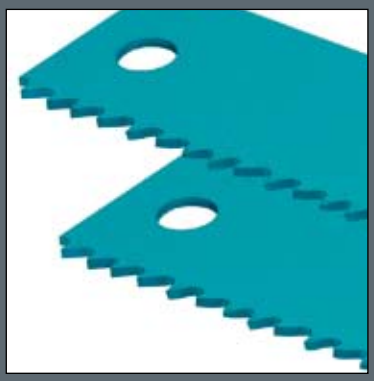
Ref.	Dimension (mm)	Teeth per inch	
		A	P
B.HB03	3 x 0.63	4; 6	4; 6
B.HB04	4 x 0.63	4; 6	4; 6
B.HB06	6 x 0.63	4; 6	4; 6
B.HB08	8 x 0.63	4; 6	4; 6
B.HB10	10 x 0.63	3; 4; 6	3; 4; 6
B.HB13	13 x 0.63	3; 4; 6	3; 4; 6

Wood Cutting
Bandsaw Blades

Saw blades made from chrome steel (DCN) or orig. Sweden steel (Sweden)

Ref.	Dimension (mm)	Tooth spacing (mm)
B.HB06	6 x 0.6	5
B.HB08	8 x 0.6	5
B.HB10	10 x 0.6	5
B.HB15	15 x 0.6	6
B.HB20	20 x 0.7	8
B.HB25	25 x 0.7	8
B.HB30	30 x 0.75	9
B.HB35	35 x 0.8	9
B.HB40	40 x 0.8	10
B.HB45	45 x 0.9	11
B.HB50	50 x 0.9	12
B.HB60	60 x 1.0	14

- Saw blades in coils
- Saw blades endless welded



Power Hack Saw Blades

HSS Bi-Metal

Standard tooth; 0° rake angle

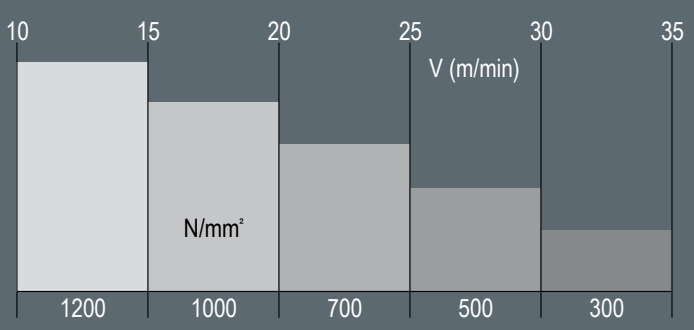
Manufactured from High Speed Steel, electron beam welded to a spring back, these bimetal blades are able to withstand heavy feed pressures, giving economical, high cutting rates. Because these blades are virtually unbreakable in normal use, they are particulary safe and therefore suitable for use by unskilled operators or on older machines. They will cut through most types of material including alloy and stainless steels.

Other dimensions available on special production.

Please tell us:
- length from centre pin hole to centre pin hole
- diameter of pin holes,
- width (from the top of the teeth to the backer)
- thickness of the blade, tooth spacing (Number of teeth in a distance of 25.4 mm – or 1 inch)
- number of pin holes and their position (Kasto machines do not have central pin holes.)

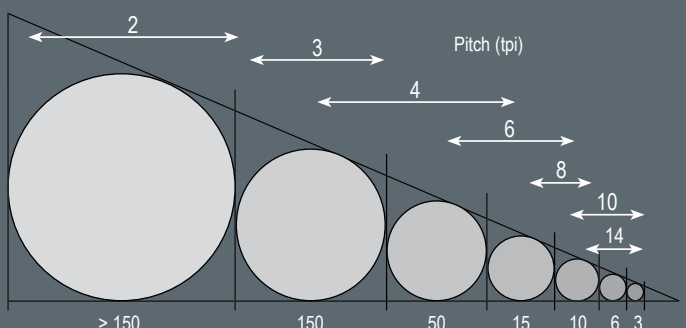
Ref.	Dimension l-w-t (mm)	KASTO	Inch	Hole (mm)	Teeth per inch					
F.MSBi 12-25	300 x 25 x 1.25		12	8.5				10	14	
F.MSBi 12-32	300 x 32 x 1.60		12	8.5		6	8	10	14	
F.MSBi 14-25	350 x 25 x 1.25		14	8.5		6		10	14	
F.MSBi 14-32	350 x 32 x 1.60		14	8.5	4	6	8	10	14	18
F.MSBi 14-38	350 x 38 x 2.00		14	8.5	4		8		14	
F.MSBi 16-32	400 x 32 x 1.60		16	8.5	4	6	8	10	14	18
F.MSBi 16-38	400 x 38 x 2.00	KASTO	16	8.5		6		10	14	
F.MSBi 16-38	400 x 38 x 2.00		16	8.5	4	6	8	10	14	
F.MSBi 17-32	425 x 32 x 1.60		17	8.5		6	8	10		
F.MSBi 18-32	450 x 32 x 1.60		18	10.5	4	6	8	10	14	
F.MSBi 18-38	450 x 38 x 2.00	KASTO	18	8.5	4	6		10	14	
F.MSBi 18-38	450 x 38 x 2.00		18	10.5	4	6	8	10	14	
F.MSBi 18-45	450 x 45 x 2.25		18	10.5	4	6		10		
F.MSBi 20-38	500 x 38 x 2.00	KASTO	20	8.5	4	6				
F.MSBi 20-38	500 x 38 x 2.00		20	10.5	4	6		10		
F.MSBi 20-45	500 x 45 x 2.25		20	10.5	4	6	8	10		
F.MSBi 20-50	500 x 50 x 2.50	KASTO	20	10.5	3	4	6	8	10	
F.MSBi 20-50	500 x 50 x 2.50		20	13	3	4	6	8	10	
F.MSBi 21-45	525 x 45 x 2.25		21	10.5	4	6		10		
F.MSBi 22-45	550 x 45 x 2.25		22	10.5	4	6		10		
F.MSBi 22-50	550 x 50 x 2.50	KASTO	22	10.5	3	4	6	8	10	
F.MSBi 22-50	550 x 50 x 2.50		22	13	3	4	6	8	10	
F.MSBi 23-45	575 x 45 x 2.25		23	13	4	6		10		
F.MSBi 23-50	575 x 50 x 2.50	KASTO	23	10.5	3	4	6	8	10	
F.MSBi 23-50	575 x 50 x 2.50		23	13	3	4	6	8	10	
F.MSBi 24-45	600 x 45 x 2.25		24	13			6			
F.MSBi 24-50	600 x 50 x 2.50	KASTO	24	10.5	3	4	6	8		
F.MSBi 24-50	600 x 50 x 2.50		24	13	3	4	6	8		
F.MSBi 26-50	650 x 50 x 2.50	KASTO	26	10.5	3	4	6	8	10	
F.MSBi 26-50	650 x 50 x 2.50		26	13	3	4	6	8	10	
F.MSBi 28-50	700 x 50 x 2.50	KASTO	28	10.5	3	4	6	8	10	
F.MSBi 28-50	700 x 50 x 2.50		28	13	3	4	6	8	10	

Cutting Speed



Material toughness

Range of applications

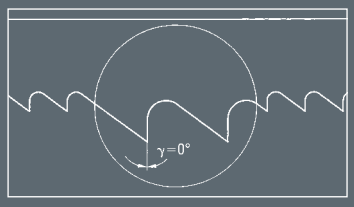


Cross sections (Pipe wall) in mm

HSS Universal (AISI M2) ALLHARD; Standard tooth 0°

Universal saw blade

- Our universal saw blade for most cutting areas.
- Uncomplicated design, robust and reliable, but with maximum tool life even in the top toughness range.
- Produced from excellent high-speed steel.
- Manufactured with modern equipment, vacuum heat treated and steam tempered.



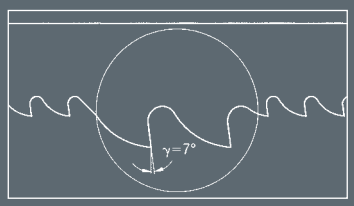
Ref.	Dimension l-w-t (mm)	Length (Zoll)	Teeth per inch	Weight (g)
F.MU 12-25N	300 x 25 x 1.25	12	8, 10, 14, 24	81
F.MU 12-25.1N	300 x 25 x 1.50	12	4, 6, 8, 10, 14	97
F.MU 12-30N	300 x 30 x 1.50	12	4, 6, 8, 10, 14, 24	117
F.MU 12-30.1N	300 x 30 x 2.00	12	4, 6, 8, 10, 14	156
F.MU 12-32N	300 x 32 x 1.50	12	4, 6, 10	125
F.MU 13-30N	325 x 30 x 1.50	13	4, 6, 8, 10, 14	126
F.MU 14-25N	350 x 25 x 1.25	14	6, 8, 10, 14, 24	94
F.MU 14-25.1N	350 x 25 x 1.50	14	6, 8, 10, 14, 24	113
F.MU 14-30N	350 x 30 x 1.50	14	4, 6, 8, 10, 14, 24	135
F.MU 14-30.1N	350 x 30 x 2.00	14	4, 6, 8, 10, 14	180
F.MU 14-32N	350 x 32 x 1.50	14	4, 6, 10	144
F.MU 14-32.1N	350 x 32 x 2.00	14	4, 6, 8, 10, 14	193
F.MU 14-35N	350 x 35 x 2.00	14	3, 4, 6, 8, 10, 14	211
F.MU 14-36N	350 x 36 x 1.50	14	4, 6, 10	163
F.MU 14-36.1N	350 x 36 x 2.00	14	4, 6, 8, 10	217
F.MU 15-30N	375 x 30 x 1.50	15	4, 6, 8, 10, 14	144
F.MU 16-25N	400 x 25 x 1.25	16	6, 8, 10, 14, 24	107
F.MU 16-25.1N	400 x 25 x 1.50	16	6, 10, 14, 24	128
F.MU 16-30N	400 x 30 x 1.50	16	4, 6, 8, 10, 14, 18, 24	153
F.MU 16-30.1N	400 x 30 x 2.00	16	3, 4, 6, 8, 10, 14	205
F.MU 16-32N	400 x 32 x 1.50	16	4, 6, 10	164
F.MU 16-32.1N	400 x 32 x 1.60	16	4, 6, 8, 10	175
F.MU 16-32.2N	400 x 32 x 2.00	16	4, 6, 8, 10, 14	218
F.MU 16-35N	400 x 35 x 2.00	16	3, 4, 6, 8, 10, 14	240
F.MU 16-36N	400 x 36 x 2.00	16	2, 3, 4, 6, 8, 10, 14	245
F.MU 16-38N	400 x 38 x 2.00	16	3, 4, 6, 10	259
F.MU 16-40N	400 x 40 x 2.00	16	3, 4, 6, 8, 10, 14	274
F.MU 17-30N	425 x 30 x 2.00	17	3, 4, 6, 8, 10, 14	218
F.MU 17-35N	425 x 35 x 2.00	17	3, 4, 6, 8, 10	254
F.MU 18-30N	450 x 30 x 1.50	18	6, 10, 14	174
F.MU 18-30.1N	450 x 30 x 2.00	18	4, 6, 8, 10, 14	231
F.MU 18-32N	450 x 32 x 1.50	18	4, 6, 10	185
F.MU 18-32.1N	450 x 32 x 2.00	18	4, 6, 8, 10, 14	247
F.MU 18-35N	450 x 35 x 2.00	18	4, 6, 8, 10	270
F.MU 18-38N	450 x 38 x 2.00	18	3, 4, 6, 8, 10, 14	293
F.MU 18-40N	450 x 40 x 2.00	18	2, 3, 4, 6, 8, 10, 14	308
F.MU 18-45N	450 x 45 x 2.00	18	3, 4, 6	347
F.MU 18-45.1N	450 x 45 x 2.25	18	3, 4, 6	382
F.MU 19-35N	475 x 35 x 2.00	19	4, 6, 8, 10	286
F.MU 20-38N	500 x 38 x 2.00	20	3, 4, 6, 8, 10, 14	325
F.MU 20-40N	500 x 40 x 2.00	20	3, 4, 6, 8, 10, 14	342
F.MU 20-40.1N	500 x 40 x 2.50	20	4, 6, 8, 10	428
F.MU 20-45N	500 x 45 x 2.00	20	3, 4, 6, 8	385
F.MU 20-48N	500 x 48 x 2.50	20	2, 3, 4, 6, 8, 10	523
F.MU 20-50N	500 x 50 x 2.50	20	3, 4, 6, 10	542
F.MU 21-38N	525 x 38 x 2.00	21	4, 6, 8, 10	341
F.MU 21-40N	525 x 40 x 2.00	21	4, 6, 8, 10	359
F.MU 21-45N	525 x 45 x 2.50	21	3, 4, 6, 8, 10	505
F.MU 21-45.1N	525 x 45 x 2.25	21	3, 4, 6	455
F.MU 21-50N	525 x 50 x 2.50	21	2, 3, 4, 6, 8	567
F.MU 22-40N	550 x 40 x 2.00	22	4, 6, 8, 10	375
F.MU 22-40.1N	550 x 40 x 2.50	22	4, 6	468
F.MU 22-45N	550 x 45 x 2.00	22	2, 3, 4, 6, 8, 10	421
F.MU 22-45.1N	550 x 45 x 2.50	22	3, 4, 6, 8, 10	527
F.MU 22-50N	550 x 50 x 2.50	22	2, 3, 4, 6, 8, 10	592
F.MU 23-45N	575 x 45 x 2.50	23	2, 3, 4, 6, 8, 10	555
F.MU 23-50N	575 x 50 x 2.50	23	2, 3, 4, 6, 8, 10	617
F.MU 24-50N	600 x 50 x 2.50	24	2, 3, 4, 6, 8, 10	636
F.MU 25-60N	625 x 60 x 2.50	25	2, 3, 4, 6, 8	800
F.MU 26-50N	650 x 50 x 2.50	26	2, 3, 4, 6, 8, 10	692
F.MU 26-55N	650 x 55 x 2.50	26	2, 3, 4, 6, 8, 10	761
F.MU 26-60N	650 x 60 x 3.00	26	2, 3, 4, 6	996
F.MU 28-50N	700 x 50 x 2.50	28	2, 3, 4, 6, 8, 10	742
F.MU 28-55N	700 x 55 x 2.50	28	2, 3, 4, 6, 8, 10	816
F.MU 28-60N	700 x 60 x 3.00	28	2, 3, 4, 6	1068
F.MU 30-50N	750 x 50 x 2.50	30	2, 3, 4, 6	800
F.MU 30-60N	750 x 60 x 3.00	30	2, 3, 4, 6	1152
F.MU 30-63N	750 x 63 x 2.50	30	2, 3, 4, 6	1008
F.MU 32-70N	800 x 70 x 3.00	32	2, 3, 4, 6, 8, 10	1428

Other dimensions are also available.

HSS Positive (AISI M2) ALLHARD; Hook tooth 7° positive

For tough materials and materials which produce long chips.

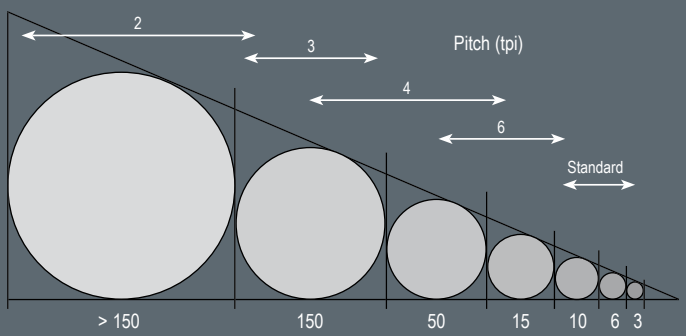
- HSS-DMo5-Aisi M2 is filling the space between the universal saw blade and the special saw blade.
- Optimum results for cutting structural steels, case hardened steels and tempered steels up to a toughness of about 800 N/mm².
- An addition for stainless steels with a cross section of less than 50 mm or a pipe wall of less than 10 mm with appropriate tooth spacing.



Ref.	Dimension l/w/t (mm)	Inch Ø	Teeth per inch	Weight (g)
F.MU 12-30VG7	300 x 30 x 2.00	12	6	156
F.MU 14-30VG7	350 x 30 x 2.00	14	3, 4, 6	180
F.MU 14-35VG7	350 x 35 x 2.00	14	3, 4, 6	211
F.MU 14-36VG7	350 x 36 x 2.00	14	3, 4, 6	217
F.MU 16-30VG7	400 x 30 x 1.50	16	6	153
F.MU 16-30.1VG7	400 x 30 x 2.00	16	6	205
F.MU 16-35VG7	400 x 35 x 2.00	16	3, 4, 6	240
F.MU 16-40VG7	400 x 40 x 2.00	16	3, 4, 6	274
F.MU 17-35VG7	400 x 35 x 2.00	17	3, 4, 6	254
F.MU 18-35VG7	450 x 35 x 2.00	18	3, 4, 6	270
F.MU 18-40VG7	450 x 40 x 2.00	18	3, 4, 6	308
F.MU 18-45VG7	450 x 45 x 2.00	18	2, 3, 4, 6	347
F.MU 20-40VG7	500 x 40 x 2.00	20	3, 4, 6	342
F.MU 20-40.1VG7	500 x 40 x 2.50	20	3, 4, 6	428
F.MU 20-48VG7	500 x 48 x 2.50	20	2, 3, 4, 6	523
F.MU 20-50VG7	500 x 50 x 2.50	20	2, 3, 4, 6	542
F.MU 21-40VG7	525 x 40 x 2.00	21	2, 3, 4, 6	359
F.MU 21-45VG7	525 x 45 x 2.50	21	2, 3, 4, 6	505
F.MU 21-50VG7	525 x 50 x 2.50	21	2, 3, 4, 6	567
F.MU 22-45VG7	550 x 45 x 2.00	22	4, 6	421
F.MU 22-50VG7	550 x 50 x 2.50	22	2, 3, 4, 6	592
F.MU 23-45VG7	575 x 45 x 2.50	23	2, 3, 4, 6	555
F.MU 23-50VG7	575 x 50 x 2.50	23	2, 3, 4, 6	617
F.MU 24-50VG7	600 x 50 x 2.50	24	2, 3, 4, 6	636
F.MU 25-60VG7	625 x 60 x 2.50	25	2, 3, 4	800
F.MU 26-50VG7	650 x 50 x 2.50	26	3, 4, 6	692
F.MU 26-55VG7	650 x 55 x 2.50	26	2, 3, 4, 6	761
F.MU 26-60VG7	650 x 60 x 3.00	26	2, 3, 4	996
F.MU 28-50VG7	700 x 50 x 2.50	28	2, 3	742
F.MU 28-55VG7	700 x 55 x 2.50	28	2, 3, 4, 6	816
F.MU 28-60VG7	700 x 60 x 3.00	28	2, 3, 4	1068
F.MU 32-70VG7	800 x 70 x 3.00	32	2, 3	1428
F.MU 34-63VG7	850 x 63 x 3.50	34	2, 3	1577
F.MU 34-75VG7	850 x 75 x 3.00	34	2, 3	1620
F.MU 38-110VG7	950 x 110 x 3.00	38	2, 3	2666
F.MU 40-126VG7	1000 x 126 x 3.50	40	2, 3	3662
F.MU 47-144VG7	1160 x 144 x 3.50	47	2, 3, 4	4838

HSS-DMo5 (AISI M2) – ALLHARD;
Hook tooth 7° positive

Range of applications



Cross sections (Pipe wall) in mm

HSS Vario Positive

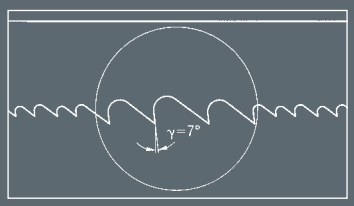
(AISI M2) – ALLHARD; Variable tooth spacing 7° positive

For tough materials and materials with produce long chips.

Variable tooth spacing reduces vibration and the blade lives longer.

For quality cutting with maximum performance

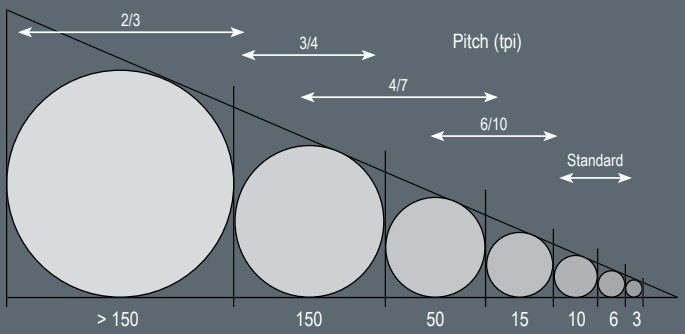
- The toothing with a positive rake of 7 degrees allows most materials to be cut more quickly.
- Pilot teeth produce a straight cut. Variable tooth spacing means that the saw blades need to be changed less frequently as a result of the large range of applications.
- Optimum tooth geometry with variable spacing ensures a clean low-vibration cut at minimum noise level.



Ref.	Dimension l/w/t (mm)	Inch Ø	Teeth per inch	Weight (g)
F.MU 12-30VP7	300 x 30 x 2.00	12	3-4, 4-7, 6-10	156
F.MU 14-30VP7	350 x 30 x 2.00	14	3-4, 4-7, 6-10	180
F.MU 14-35VP7	350 x 35 x 2.00	14	3-4, 4-7, 6-10	211
F.MU 14-36VP7	350 x 36 x 2.00	14	3-4, 4-7, 6-10	217
F.MU 16-30VP7	400 x 30 x 1.50	16	3-4, 4-7, 6-10	153
F.MU 16-30.1VP7	400 x 30 x 2.00	16	3-4, 4-7, 6-10	205
F.MU 16-35VP7	400 x 35 x 2.00	16	3-4, 4-7, 6-10	240
F.MU 16-40VP7	400 x 40 x 2.00	16	3-4, 4-7, 6-10	274
F.MU 17-35VP7	400 x 35 x 2.00	17	3-4, 4-7, 6-10	254
F.MU 18-35VP7	450 x 35 x 2.00	18	3-4, 4-7, 6-10	270
F.MU 18-40VP7	450 x 40 x 2.00	18	2-3, 3-4, 4-7, 6-10	308
F.MU 18-45VP7	450 x 45 x 2.00	18	2-3, 3-4, 4-7, 6-10	347
F.MU 20-40VP7	500 x 40 x 2.00	20	2-3, 3-4, 4-7	342
F.MU 20-40.1VP7	500 x 40 x 2.50	20	2-3, 3-4, 4-7	428
F.MU 20-48VP7	500 x 48 x 2.50	20	2-3, 3-4, 4-7	523
F.MU 20-50VP7	500 x 50 x 2.50	20	2-3, 3-4, 4-7	542
F.MU 21-40VP7	525 x 40 x 2.00	21	3-4	359
F.MU 21-45VP7	525 x 45 x 2.50	21	3-4	505
F.MU 21-50VP7	525 x 50 x 2.50	21	3-4	567
F.MU 22-45VP7	550 x 45 x 2.00	22	2-3, 3-4, 4-7	421
F.MU 22-50VP7	550 x 50 x 2.50	22	2-3, 3-4, 4-7	592
F.MU 23-45VP7	575 x 45 x 2.50	23	2-3, 3-4, 4-7	555
F.MU 23-50VP7	575 x 50 x 2.50	23	2-3, 3-4, 4-7	617
F.MU 24-50VP7	600 x 50 x 2.50	24	2-3, 3-4, 4-7	636
F.MU 25-60VP7	625 x 60 x 2.50	25	2-3, 3-4	800
F.MU 26-50VP7	650 x 50 x 2.50	26	2-3, 3-4, 4-7	692
F.MU 26-55VP7	650 x 55 x 2.50	26	2-3, 3-4, 4-7	761
F.MU 26-60VP7	650 x 60 x 3.00	26	2-3, 3-4, 4-7	996
F.MU 28-50VP7	700 x 50 x 2.50	28	2-3, 3-4	742
F.MU 28-55VP7	700 x 55 x 2.50	28	2-3, 3-4, 4-7	816
F.MU 28-60VP7	700 x 60 x 3.00	28	2-3, 3-4, 4-7	1068
F.MU 32-70VP7	800 x 70 x 3.00	32	2-3, 3-4	1428
F.MU 34-63VP7	850 x 63 x 3.50	34	2-3, 3-4	1577
F.MU 34-75VP7	850 x 75 x 3.00	34	2-3	1620
F.MU 38-110VP7	950 x 110 x 3.00	38	2-3	2666
F.MU 40-126VP7	1000 x 126 x 3.50	40	2-3	3662
F.MU 47-144VP7	1160 x 144 x 3.50	47	2-3	4838

Universal HSS-DMo5 (AISI M2) – ALLHARD; Variable tooth spacing 7° positive

Range of applications



Cross sections (pipe wall) in mm

HSS Super Positive (AISI M2); Hook tooth 13° positive

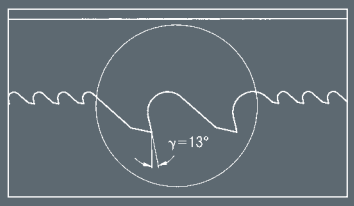
For cutting stainless and acid-resisting steel

- The increased use of stainless and acid-resisting steels (e. g. VA steels) requires an appropriate saw blade for cutting these difficult materials.
- As a result of the perfect cutting edge geometry, excellent cutting results are achieved.
- With 13 degrees positive rake produces optimum penetration of the material to be sawn.
- The economical cutting of VA pipes with walls from 10 mm is no problem.

Direction for application:

Tooth spacing
3 teeth/inch for cross sections from 50 • 200 mm
(pipes with walls from 10 mm)
2 teeth/inch for cross sections from 150 mm

Cutting speed
Stainless and acid-resisting steels: 10 to 20 m/min



Ref.	Dimension l/w/t (mm)	Inch	Hole Ø (mm)	Teeth per inch	
F.MU 14-35G13	350 x 35 x 2.00	14	8.5		3
F.MU 16-35G13	400 x 35 x 2.00	16	10.5		3
F.MU 16-35G13	400 x 35 x 2.00	16	8.5		3
F.MU 17-35G13	425 x 35 x 2.00	17	8.5		3
F.MU 18-35G13	450 x 35 x 2.00	18	8.5		3
F.MU 18-40G13	450 x 40 x 2.00	18	10.5	2	3
F.MU 18-40G13	450 x 40 x 2.00	18	Kasto	2	3
F.MU 18-45G13	450 x 45 x 2.00	18	10.5	2	3
F.MU 20-40G13	500 x 40 x 2.00	20	10.5	2	3
F.MU 20-40G13	500 x 40 x 2.00	20	Kasto	2	3
F.MU 20-40G13	500 x 40 x 2.50	20	10.5	2	3
F.MU 20-48G13	500 x 48 x 2.50	20	Kasto	2	3
F.MU 20-50G13	500 x 50 x 2.50	20	10.5		3
F.MU 21-40G13	525 x 40 x 2.00	21	10.5	2	3
F.MU 21-45G13	525 x 45 x 2.50	21	10.5	2	3
F.MU 22-45G13	550 x 45 x 2.00	22	Kasto	2	3
F.MU 22-50G13	550 x 50 x 2.50	22	10.5	2	3
F.MU 23-45G13	575 x 45 x 2.50	23	10.5	2	3
F.MU 23-50G13	575 x 50 x 2.50	23	Kasto	2	3
F.MU 24-50G13	600 x 50 x 2.50	24	10.5	2	3
F.MU 24-50G13	600 x 50 x 2.50	24	Kasto	2	3
F.MU 25-60G13	625 x 60 x 2.50	25	10.5	2	3
F.MU 26-50G13	650 x 50 x 2.50	26	13	2	3
F.MU 26-50G13	650 x 50 x 2.50	26	Kasto	2	3
F.MU 26-55G13	650 x 55 x 2.50	26	Kasto	2	3
F.MU 26-60G13	650 x 60 x 3.00	26	13	2	3
F.MU 26-60G13	650 x 60 x 3.00	26	Kasto	2	3
F.MU 27-55G13	675 x 55 x 2.50	27	Kasto	2	3
F.MU 28-50G13	700 x 50 x 2.50	28	13	2	3
F.MU 28-50G13	700 x 50 x 2.50	28	Kasto	2	3
F.MU 28-55G13	700 x 55 x 2.50	28	Kasto	2	3
F.MU 28-55G13	700 x 55 x 2.50	28	Behr. 12.5	2	3
F.MU 28-60G13	700 x 60 x 3.00	28	16.5	2	3
F.MU 32-70G13	800 x 70 x 3.00	32	16.5	2	3
F.MU 34-70G13	850 x 70 x 3.00	34	16.5		3
F.MU 34-75G13	850 x 75 x 3.00	34	Behringer	2	
F.MU 34-63G13	850 x 63 x 3.50	34	Kasto	2	3
F.MU 36-70G13	900 x 70 x 3.00	36	16.5		3
F.MU 38-70G13	950 x 70 x 3.00	38	16.5		3
F.MU 38-110G13	950 x 110 x 3.00	38	16.5	2	3

Cobalt HSS-Co. Blade for special application.

Made of HSS-Cobalt M35 steel.

A hardness of 67 degree Rockwell and 8% Cobalt alows user to cut extreme hard materials of more than 120 kp/mm² toughness.

Ref.	Dimension l/w/t (mm)	Inch	Hole Ø (mm)	Teeth per inch
F.MK 18-40	450 x 40 x 2.0	18	10.5	4; 6
F.MK 20-40	500 x 40 x 2.0	20	10.5	4; 6
F.MK 24-50	600 x 50 x 2.5	24	10.5	4; 6
F.MK 28-50	700 x 50 x 2.5	28	13	3; 4; 6
F.MK 30-50	750 x 50 x 2.5	30	13	3; 4; 6

Manufactured only by customer´s order.

Sabre Saw Blades

SSN — Standard size sabre saw blades; size: 19 x 0.9 mm 3/4 inch x 0.035 inch

High quality blades made from HSS-Bi-metal steel.

Flexible and rigid for fast cuts and long tool life.

Standard size for most applications.

Ref.	Length mm - Inch	Standard tooth profile						Variable
H.SSN 070	70 - 2 3/4″					18		
H.SSN 100	100 - 4″				14	18	24	
H.SSN 150	150 - 6″	4	6	10	14	18	24	
H.SSNV 150	150 - 6″							10 - 14
H.SSN 200	200 - 8″	4	6	10	14	18	24	
H.SSNV 200	200 - 8″							10 - 14
H.SSN 228	228 - 9″			10	14	18		
H.SSNV 228	228 - 9″							10 - 14
H.SSN 250	250 - 10″			10	14			
H.SSNV 250	250 - 10″							10 - 14
H.SSN 280	280 - 11″	4	6	10	14	18	24	
H.SSNV 280	280 - 11″							10 - 14

Available as neutral bulk packed or branded in plastic packs

SSP — Special size sabre saw blades; size: 19 x 1.27 mm 3/4 inch x 0.042 inch

High quality blades made from HSS-Bi-metal steel.

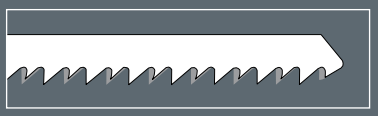
Flexible and rigid for fast cuts and long tool life.

Special size for best accurate cuts, very rigid.

Ref.	Length mm - Inch	Standard tooth profile					Variable
H.SSP 150	150 - 6″	4	6	10	14	18	
H.SSPV 150	150 - 6″						10 - 14
H.SSP 200	200 - 8″	4	6	10	14	18	
H.SSPV 200	200 - 8″						10 - 14
H.SSP 228	228 - 9″			10	14	18	
H.SSPV 228	228 - 9″						10 - 14
H.SSP 250	250 - 10″			10	14		
H.SSPV 250	250 - 10″						10 - 14
H.SSP 280	280 - 11″	4	6	10	14		
H.SSPV 280	280 - 11″						10 - 14

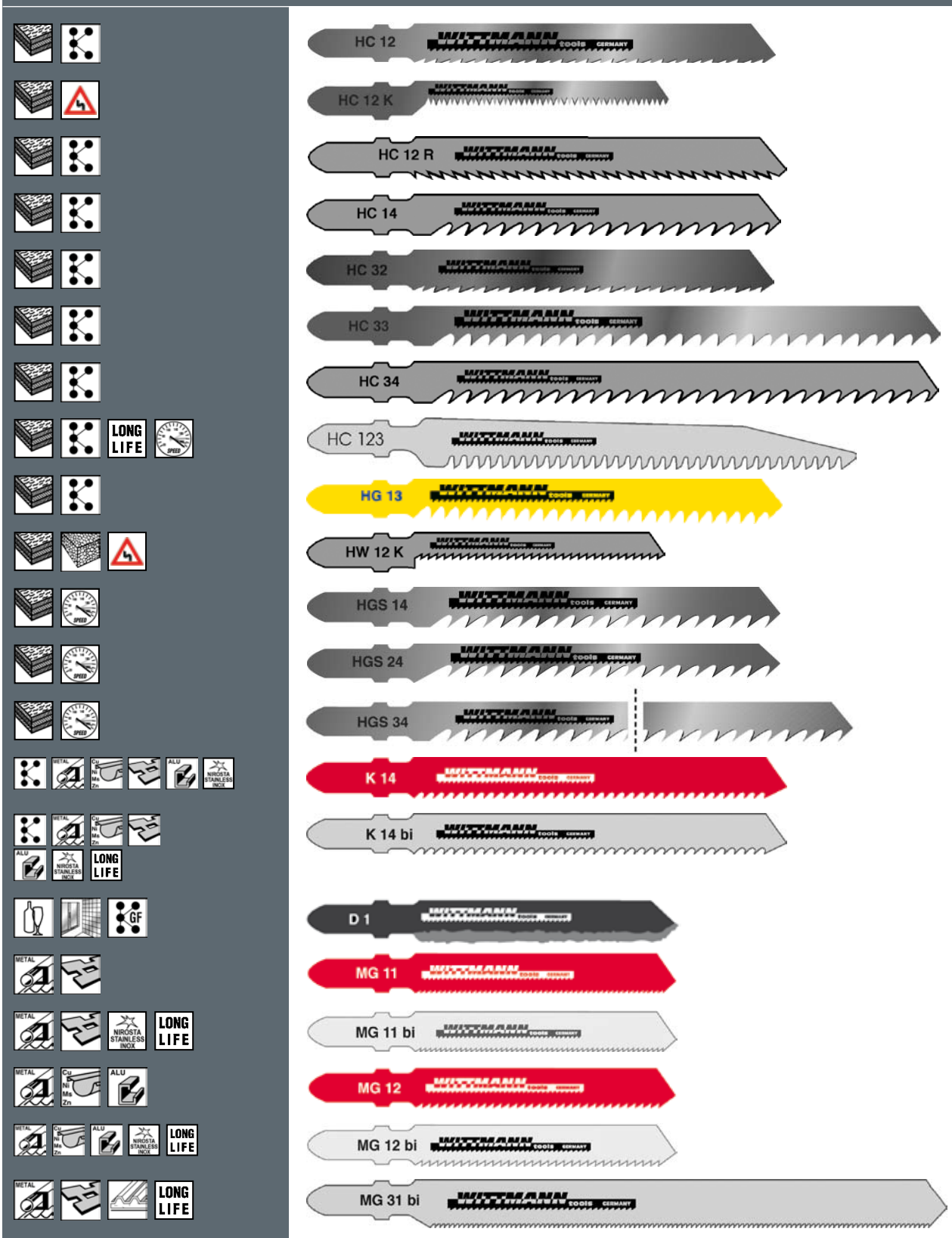
Available as neutral bulk packed or branded in plastic packs

Jigsaw Blades



Ref.	Reference no. Bosch / B&D	Material	Length (mm)	Width (mm)	Thickness (mm)	Pitch (mm)	TPI
G.HC12	T101B	HCS	100	7.8	1.45	2.5	10
G.HC12K	T101AO	HCS	76.5	4.7	1.25	1.35	18
G.HC12R	T101BR	HCS	76.5	4.7	1.25	1.35	18
G.HC14	T101D	HCS	100	7.8	1.45	4.0	6
G.HC32	T101BR	HCS	132	7.8	1.45	2.5	10
G.HC33	T301CD	HCS	132	7.8	1.45	2.5	10
G.HC34	T301DL	HCS	132	7.8	1.45	4.0	6
G.HC123	T234X	HCS	100	7.8	1.45	2.5	10
G.HG13	T111C	HCS	100	9.8	1.45	3.0	8
G.HW12K	T119BO	HCS	76	5	1.0	2.0	22
G.HGS14	T144D	HCS	100	7.8	1.27	4.0	6
G.HGS24	T244D	HCS	100	6.5	1.27	4.0	6
G.HGS34	T344D	HCS	132	7.8	1.27	4.0	6
G.K14	T127D	HSS	100	7.8	1.0	3.0	8
G.K14bi	T127DF	Bi-Metal	100	7.8	1.0	3.0	8
G.D1	T130Riff	HM	80	8.8	0.8	Grit	
G.MG11	T118A	HSS	76.5	7.8	1.0	1.2	20
G.MG11BI	T118AF	Bi-Metal	76.5	7.8	1.0	1.2	20
G.MG12	T118B	HSS	76.5	7.8	1.0	2	12.5
G.MG12BI	T118BF	Bi-Metal	76.5	7.8	1.0	2	12.5
G.MG31BI	T318AF	Bi-Metal	132	9.8	1.0	1.2	20

Ref.	TOOTHING		SETTING		
	milled	ground	wavy set	raker set	conical
G.HC12		x			x
G.HC12K		x			x
G.HC12R		x			x
G.HC14		x			x
G.HC32		x			x
G.HC33		x			x
G.HC34		x			x
G.HC123		x			x
G.HG13	x			x	
G.HW12K	x		x		
G.HGS14		x		x	
G.HGS24		x		x	
G.HGS34		x		x	
G.K14	x			x	
G.K14bi	x			x	
G.D1					
G.MG11	x		x		
G.MG11BI	x		x		
G.MG12	x		x		
G.MG12BI	x		x		
G.MG31BI	x		x		



Plastics

Glass-fibre reinforced products

Steelpipes, steelprofiles

Non-ferrous metals

Sheet metals

Aluminium

Ceramics

Glass

Quick cut

Curved saw blade

High cutting performance

Stainless steel

Insulation material

Sandwich materials

Plywood, hard wood, soft wood, chipboard

Hand Hacksaw Blades

HSS Bi-Metal

High performance blade; BEST SELLER

- Blade manufactured in two types of steel, with a cutting edge in molybdenum high-speed steel, and a flexible back in spring steel to withstand loads and avoid breakage.
- Recommended for all types of materials.

Ref.	Teeth per inch	Piece	Dimension (mm)
I.HBM18	18	100 or 50	300 x 12.7 x 0.63
I.HBM24	24	100 or 50	300 x 12.7 x 0.63
I.HBM32	32	100 or 50	300 x 12.7 x 0.63
I.HBM18/28	18–28	100 or 50	300 x 12.7 x 0.63

ALLHARD

Very rigid, for accurate cutting

- Molybdenum high-speed steel, fully hardend, with high cutting efficiency and long life.
- Recommended for all types of materials.

Ref.	Teeth per inch	Piece	Dimension (mm)
I.HSW14	14	100 or 50	300 x 12.7 x 0.63
I.HSW18	18	100 or 50	300 x 12.7 x 0.63
I.HSW24	24	100 or 50	300 x 12.7 x 0.63
I.HSW32	32	100 or 50	300 x 12.7 x 0.63
Double-sided teething			
I.HSWDC	24	50	300 x 25 x 0.71

HSS Flexible

- Standard blade in High Speed Steel, high quality, induction teeth hardening only.
- Unbreakable in normal conditions, allowing higher cutting speed.

Ref.	Teeth per inch	Piece	Dimension (mm)
I.HRF18	18	100 or 50	300 x 12.7 x 0.63
I.HRF24	24	100 or 50	300 x 12.7 x 0.63
I.HRF32	32	100 or 50	300 x 12.7 x 0.63

Carbon-Flex

- Carbon steel blade, most flexible, with tempered tips and greatly stiffened back.
- Recommended for cutting low alloy and medium-hardness steels, very suitable for cutting pipes and profiles.
- Also available as double-sided hand saw (DC).

Ref.	Teeth per inch	Piece	Dimension (mm)
I.HEF18	18	100 or 50	300 x 12.7 x 0.63
I.HEF24	24	100 or 50	300 x 12.7 x 0.63
I.HEF32	32	100 or 50	300 x 12.7 x 0.63
Double-sided teething			
I.HEFDC18	18	50	300 x 25 x 0.71
I.HEFDC24	24	50	300 x 25 x 0.71
I.HEFDC32	32	50	300 x 25 x 0.71

Hacksaw Frames

Type BSH 17

Heavy duty aluminium cast frame with rubber handle

Product Code	Length	Height	net weight/pc	box of 10
Type BSH 17	40 cm	15 cm	0.525 kg	5.5 kg

Type BSH 18

Tubular steel contruction with strong steel handle

Product Code	Length	Height	net weight/pc	box of 10
Type BSH 18	44 cm	13.5 cm	0.540 kg	5.6 kg

Hole Saws

Bi-Metal Hole Saw

Manufactured in high-speed steel HSS Bi-Metal M42 (8 % Cobalt).

- Variable Pitch: 4/6 Teeth per inch.
- Normal Pitch: 10 Teeth per inch.
- for skilled craftsmen and industrial use

Other dimensions are also available.

Ref.	Diameter (mm)	Inch	Ref.	Diameter (mm)	Inch
J.COS14V	14	9/16	J.COS60V	60	2 3/8
J.COS16V	16	5/8	J.COS63V	63	1 7/8
J.COS17V	17	11/16	J.COS64V	64	2 1/2
J.COS19V	19	3/4	J.COS65V	65	2 3/16
J.COS20V	20	25/32	J.COS67V	67	2 5/9
J.COS21V	21	13/16	J.COS68V	68	2 11/16
J.COS22V	22	7/8	J.COS70V	70	2 3/4
J.COS23V	23	29/32	J.COS73V	73	2 7/8
J.COS24V	24	15/16	J.COS76V	76	3
J.COS25V	25	1	J.COS79V	79	3 1/8
J.COS27V	27	1 1/16	J.COS83V	83	3 1/4
J.COS29V	29	1 1/8	J.COS86V	86	3 3/8
J.COS30V	30	1 3/16	J.COS89V	89	3 1/2
J.COS32V	32	1 1/4	J.COS92V	92	3 5/8
J.COS33V	33	1 5/16	J.COS95V	95	3 3/4
J.COS35V	35	1 3/8	J.COS98V	98	3 7/8
J.COS37V	37	1 7/16	J.COS102V	102	4
J.COS38V	38	1 1/2	J.COS105V	105	4 1/8
J.COS40V	40	1 9/16	J.COS108V	108	4 1/4
J.COS41V	41	1 5/8	J.COS111V	111	4 3/8
J.COS43V	43	1 1/16	J.COS114V	114	4 1/2
J.COS44V	44	1 3/4	J.COS121V	121	4 3/4
J.COS46V	46	1 13/18	J.COS127V	127	5
J.COS48V	48	1 7/8	J.COS133V	133	5 1/2
J.COS50V	50	1 7/8	J.COS140V	140	5 1/2
J.COS51V	51	2	J.COS146V	146	5 1/2
J.COS52V	52	2 1/16	J.COS152V	152	6
J.COS54V	54	2 1/8	J.COS160V	160	6 5/16
J.COS56V	56	1 7/8	J.COS168V	168	6 5/8
J.COS57V	57	2 1/4	J.COS177V	177	7
J.COS58V	58	1 7/8	J.COS200V	200	5 1/2
J.COS59V	59	2 5/16	J.COS210V	210	8 5/16

Hole Saw Sets

Hole Saw Sets supplied in light shockproof cases. With the most common sizes for the most frequent applications, and the corresponding hole saw arbors and accessories.
Suitable for carpenters, plumbers, electricians, mechanics, DIY, . . .

Ref.	application	Diameter (mm)	Arbors	Extension
J.EQC1	no. 1	16-22-29-35-44-51	H3A+H4A	–
J.EQC2	no. 2	19-22-29-35-38-44-51-57-68	H3A+H4A	–
J.EQC3	no. 3	19-22-25-32-35-38-44-51-57-64-68-76	H3A+H4A	EXS 330

Other combinations available on request.

Hole Saws (Grit)

Carbide gritted

Carbide gritted hole saws are best for very hard and abrasive materials like:

- cast iron,
- fiber reinforced plastic, graphite composites, carbon, plastic laminates, composition board,
- masonry materials and cement.

Ref.	Diameter (mm)	Inch	Ref.	Diameter (mm)	Inch
J.COG14N	14	9/16	J.COG64N	64	2 1/2
J.COG16N	16	5/8	J.COG65N	65	2 3/16
J.COG17N	17	11/16	J.COG67N	67	2 5/9
J.COG19N	19	3/4	J.COG68N	68	2 11/16
J.COG20N	20	25/32	J.COG70N	70	2 3/4
J.COG21N	21	13/16	J.COG73N	73	2 7/8
J.COG22N	22	7/8	J.COG76N	76	3
J.COG23N	23	29/32	J.COG79N	79	3 1/8
J.COG24N	24	15/16	J.COG83N	83	3 1/4
J.COG25N	25	1	J.COG86N	86	3 3/8
J.COG27N	27	1 1/16	J.COG89N	89	3 1/2
J.COG29N	29	1 1/8	J.COG92N	92	3 5/8
J.COG30N	30	1 3/16	J.COG95N	95	3 3/4
J.COG32N	32	1 1/4	J.COG98N	98	3 7/8
J.COG33N	33	1 5/16	J.COG102N	102	4
J.COG35N	35	1 3/8	J.COG105N	105	4 1/8
J.COG37N	37	1 7/16	J.COG108N	108	4 1/4
J.COG38N	38	1 1/2	J.COG111N	111	4 3/8
J.COG40N	40	1 9/16	J.COG114N	114	4 1/2
J.COG41N	41	1 5/8	J.COG121N	121	4 3/4
J.COG43N	43	1 1/16	J.COG127N	127	5
J.COG44N	44	1 3/4	J.COG133N	133	
J.COG46N	46	1 13/18	J.COG140N	140	5 1/2
J.COG48N	48	1 7/8	J.COG146N	146	
J.COG51N	51	2	J.COG152N	152	6
J.COG52N	52	2 1/16	J.COG160N	160	6 5/16
J.COG54N	54	2 1/8	J.COG168N	168	6 5/8
J.COG57N	57	2 1/4	J.COG177N	177	7
J.COG59N	59	2 5/16	J.COG200N	200	
J.COG60N	60	2 3/8	J.COG210N	210	8 5/16

Accessories for Bi-Metal and Carbide gritted Hole Saw Blades

Hole Saw Blade Arbors for Bi-Metal

Ref.	Hole Saw diameter	Characteristics	Arbor diameter
J.H1	from Ø 14 to Ø 30	round shaft	Ø 6.35 mm (1/4 inch)
J.H3	from Ø 14 to Ø 30	hexagonal shaft	Ø 11 mm
J.H3A	from Ø 14 to Ø 30	hexagonal shaft	Ø 9.52 mm
J.H3B	from Ø 14 to Ø 30	hexagonal shaft	Ø 8.75 mm
J.H3SDS	from Ø 14 to Ø 30	SDS plus	
J.H4	from Ø 32 to Ø 210	hexagonal shaft	Ø 11 mm
J.H4A	from Ø 32 to Ø 210	hexagonal shaft	Ø 9.52 mm
J.H4B	from Ø 32 to Ø 210	hexagonal shaft	Ø 8.75 mm
J.H4SDS	from Ø 32 to Ø 210	SDS plus	

Special production available.

Hole Saw Blade Arbors for Grit Hole Saws

Ref.	Hole Saw diameter	Characteristics	Arbor diameter
J.HC1	from Ø 14 to Ø 30	round shaft	Ø 6.35 mm (1/4 inch)
J.HC3	from Ø 14 to Ø 30	hexagonal shaft	Ø 11 mm
J.HC3A	from Ø 14 to Ø 30	hexagonal shaft	Ø 9.52 mm
J.HC3SDS	from Ø 14 to Ø 30	SDS plus	
J.HC4	from Ø 32 to Ø 210	hexagonal shaft	Ø 11 mm
J.HC4A	from Ø 32 to Ø 210	hexagonal shaft	Ø 9.52 mm
J.HC4SDS	from Ø 32 to Ø 210	SDS plus	

Special production available.

Part for Hole Saws

Arbor adapter Ref.	Reducing bore Ø 5/8" to Ø 3/8" for the use of hole saws from Ø 32 to 210 with J.H1, J.H3, J.H3a & J.H3SDS arbors.
J.AH12	

Extension

Ref.	Characteristics
J.EXT330	330 mm / Ø 11.2 mm
J.EXT330A	330 mm / Ø 9.52 mm

Spring

Ref.
J.M7

Drill HSS (ground)

Ref.	Characteristics
J.BR85 HSS	HSS-85 mm
J.BR105 HSS	HSS-105 mm
J.BR85 HM	Tungston Carbide Tipped 85 mm
J.BR105 HM	Tungston Carbide Tipped 105 mm

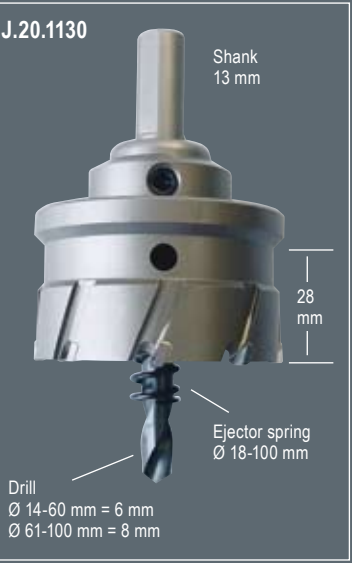
Morse Cone

Ref.	Characteristics
J.CM2	no. 2
J.CM3	no. 3

HEAVY-DUTY

Hole Saw Heavy-Duty model and core drill combined in one tool

J.20.1130

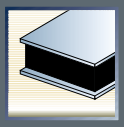


Model Ref. J.20.1130:
The hole saws comes with 13 mm shank, HSS drill, ejector spring and allen key (has to be assembled)

Model Ref. J.20.1130 A:
The Hole Saws comes without shank, centre drill, ejector spring. Choose from the accessories to individually tailor your hole saw (allen key enclosed).
- For portable machines
- For pillar drilling machines
- For core drilling machines...

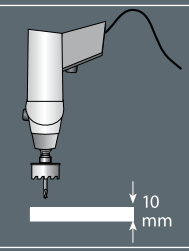
See next page to choose from the accessories.

J.20.1130 A

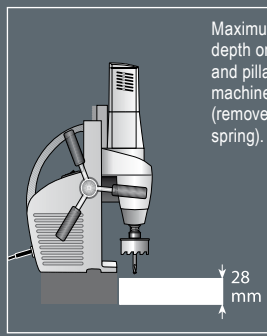
drills in:						
Maximum cutting depth:	stainless up to 28mm	steel up to 28mm	sheet metal up to 28mm	ALU/non-ferrous metal up to 28mm	plastics up to 28mm	sandwich materials up to 28mm

Application:
- for sheet material
- for pipes, vaulted surfaces
- cuts overlapping holes

For using on following machines:
Core drilling machines up to 28 mm cutting depth in steel
Pillar drilling machines up to 28 mm cutting depth in steel
Portable drilling machines up to 10 mm cutting depth in steel

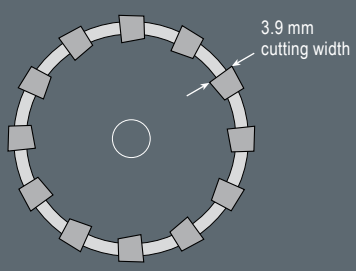


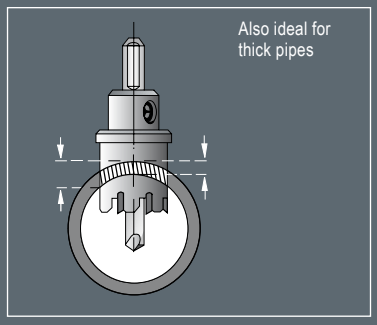
For cutting depth over 6 mm we recommend repeated chip removal by lightly lifting or quickly removing the hole saw from the hole being drilled.



Ref. J.20.1130 J.20.1130A Ø mm						
14	23	32.5	42	52	62	80
15	24	33	43	53	63	85
16	25	34	44	54	64	90
16.5	25.5	35	45	55	65	95
17	26	36	46	56	66	100
18	27	37	47	57	67	
19	28	38	48	58	68	Other Ø
20	29	39	49	59	69	on request
20.5	30	40	50	60	70	
21	31	40.5	50.5	60.5	75	
22	32	41	51	61	78	

As from diameter 61 mm we recommend to use our MT tool holder (see Ref. J.20.1135/J.20.1136)
Ø 16.5/20.5/25.5/32.5/40.5/50.5/60.5 = Drilling and thread cutting for cable connections according to the newest Euro-Norm DIN EN 60423.





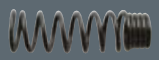
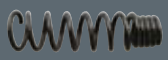
Accessories — For using portable drilling machines









shank Ø 10 mm for hole saws Ø 15-36 mm Suitable centre drill see Ref. J.20.1110 or J.20.1445.	**J.20.1131**
shank Ø 13 mm for hole saws Ø 15-60 mm Suitable centre drill see Ref. J.20.1110 or J.20.1445.	**J.20.1134**
shank Ø 13 mm for hole saws Ø 61-100 mm Suitable centre drill see Ref. J.20.1110 or J.20.1445.	**J.20.1137**
shank SDS-PLUS for hole saws Ø 16-100 mm Suitable centre drill see Ref. J.20.1133 or J.20.1446. Use only without hammer	**J.20.1123**
HSS centre drill 6x80 mm for shank (J.20.1131, J.20.1134) for average use	**J.20.1110**
HSS centre drill (cross hatch+coated) 6x80 mm for shank (J.20.1131, J.20.1134) for heavy-duty use	**J.20.1445**
HSS centre drill 8x80 mm for shank (J.20.1123, J.20.1137) for average use	**J.20.1133**
HSS centre drill (cross hatch+coated) 8x80 mm for shank (J.20.1123, J.20.1137) for heavy-duty use	**J.20.1446**
Ejector spring for centre drill Ø 6 mm = (J.20.1110, J.20.1445) Pushes the core slug out of the hole saw. Can be used from Ø 18-100 mm.	**J.20.1003**
Ejector spring for centre drill Ø 8 mm = (J.20.1133, J.20.1446) Pushes the core slug out of the hole saw. Can be used from Ø 18-100 mm.	**J.20.1006**

For using pillar drilling machines


Morse Taper 2 for hole saws Ø 16-100 mm Suitable centre drill see Ref. J.20.1133 or J.20.1446.	**J.20.1135**
Morse taper 3 for hole saws Ø 16-100 mm Suitable centre drill see Ref. J.20.1133 or J.20.1446.	**J.20.1136**

For using core drilling machines



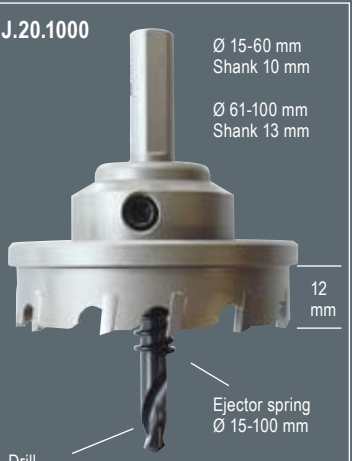


Adapter for core drilling machines with Weldon shank 19 mm for Ø 14-65 mm	**J.20.1442**
Adapter for core drilling machines with Weldon shank 32 mm for Ø 14-100 mm Strongly recommended for Ø 60-100 mm.	**J.20.1453**
Adapter for Fein- core drilling machines with Quick-In shank for Ø 14-65 mm	**J.20.1443**
Adapter for Nitto-Kohki- core drilling machines with “one touch” shank for Ø 14-65 mm	**J.20.1444**
Suitable ejector pins for above mentioned adapters (packing unit: 2 pieces)	**J.20.1271**

T.C.T. Hole Saw Short-type

Multi-tooth model for clean cutting edges and more lifetime

J.20.1000

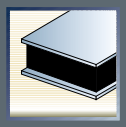


J.20.1000 A

Model Ref. J.20.1000:
The hole saws comes with 10/13 mm shank, HSS-drill, ejector spring and allen key (has to be assembled).

Model Ref. J.20.1000 A:
The hole saws comes without shank, HSS-centre drill, ejector spring (allen key enclosed). Choose from the accessories. To individually tailor your hole saw for:

- Portable machines
- Pillar drilling machines
- Core drilling machines

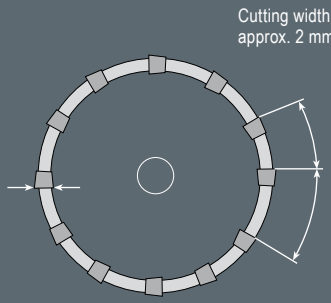
drills in:					
Maximum cutting depth:	up to 4 mm Chrome nickel steel up to 2mm	sheet metal up to 4 mm	non-ferrous metals up to 6 mm	plastics up to 6 mm	sandwich materials up to 6 mm

For using on following machines:
Core drilling machines up to 4 mm cutting depth in steel
Pillar drilling machines up to 4 mm cutting depth in steel
Portable drilling machines up to 4 mm cutting depth in steel

- High concentricity through strong construction
- Positive rake for good disposal of chips
- Large T.C. inserts for resharpening up to six times

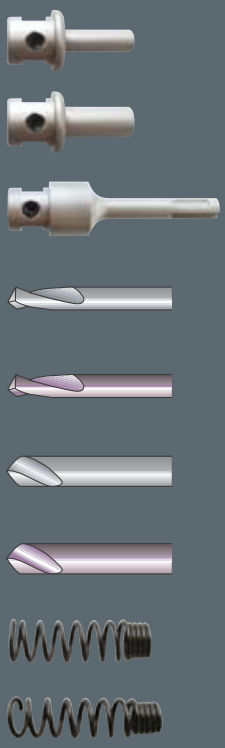
Ref.							
J.20.1000 **J.20.1000A**	Ø mm						
	15	23	32	40.5	50	60	69
	16	24	32.5	41	50.5	60.5	70
	16.5	25	33	42	51	61	75
	17	25.5	34	43	52	62	80
	18	26	35	44	53	63	85
	19	27	36	45	54	64	90
	20	28	37	46	56	65	95
	20.5	29	38	47	57	66	100
	21	30	39	48	58	67	Other Ø on
	22	31	40	49	59	68	request

Ø 16.5 , 20.5 , 25.5 , 32.5 , 40.5 , 50.5 , 60.5 = Drilling and thread cutting for cable connections according to the newest Euro-Norm DIN EN 60423.



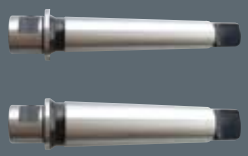
Variable teeth, less vibration, longer tool life, smoother cutting

Accessories — For using portable drilling machines



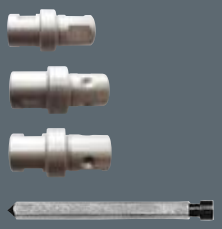
shank Ø 10 mm for hole saws Ø 15-60 mm Suitable centre drill see Ref. J.20.1011 or J.20.1440.	**J.20.1131**
shank Ø 13 mm for hole saws Ø 61-100 mm Suitable centre drill see Ref. J.20.1012 or J.20.1441.	**J.20.1137**
shank SDS-PLUS for hole saws Ø 15-100 mm Suitable centre drill see Ref. J.20.1012 or J.20.1441. Use only without hammer	**J.20.1123**
HSS centre drill 6x60 mm for shank (J.20.1131) for average use	**J.20.1011**
HSS centre drill (cross hatch+coated) 6x60 mm for shank (J.20.1131) for heavy-duty use	**J.20.1440**
HSS centre drill 8x60 mm for shank (J.20.1123, J.20.1137) for average use	**J.20.1012**
HSS centre drill (cross hatch+coated) 8x60 mm for shank (J.20.1123, J.20.1137) for heavy-duty use	**J.20.1441**
Ejector spring for centre drill Ø 6 mm = (J.20.1011. J.20.1440) Pushes the core slug out of the hole saw	**J.20.1001**
Ejector spring for centre drill Ø 8 mm = (J.20.1012, J.20.1441) Pushes the core slug out of the hole sawe	**J.20.1002**

For using pillar drilling machines



Morse Taper 2 for hole saws Ø 15-100 mm Suitable centre drill see Ref. J.20.1012 or J.20.1441.	**J.20.1135**
Morse Taper 3 for hole saws Ø 15-100 mm Suitable centre drill see Ref. J.20.1012 or J.20.1441.	**J.20.1136**

For using core drilling machines



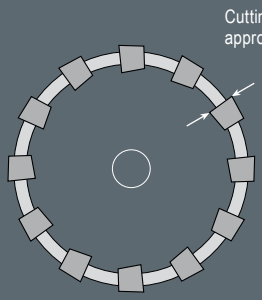
Adapter for core drilling machines with Weldon shank 19 mm	**J.20.1442**
Adapter for Fein- core drilling machines with “Quick In” shank	**J.20.1443**
Adapter for Nitto-Kohki- core drilling machines with “one touch” shank	**J.20.1444**
Suitable ejector pins for above mentioned adapters (packing unit: 2 pieces)	**J.20.1261**

HM-Hole Saw Multi Purpose

Multi-tooth model for clean cutting edges and more lifetime

J.20.1121

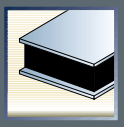
J.20.1121 A



Model Ref. J.20.1121:
The hole saws comes with 13 mm shank HSS-drill, ejector spring and allen key (has to be assembled).

Model Ref. J.20.1121 A:
The hole saws comes without shank HSS-drill, ejector spring (allen key is included).
To individually tailor your hole saw for:
- Portable machines
- Pillar drilling machines
- Core drilling machines

See next page to choose from the accessories.

drills in:						
Maximum cutting depth:	non-ferrous metals up to 60 mm	sandwich-materials up to 60 mm	plastics up to 60 mm	wood with nails up to 60 mm	wood up to 60 mm	ceramics up to 60 mm

For using on following machines:
Core drilling machines up to 60 mm cutting depth
Pillar drilling machines up to 60 mm cutting depth
Portable drilling machines up to 60 mm cutting depth

More teeth for clean cutting edges and more lifetime.
Ø 25 - 35 mm = 4 teeth
Ø 40 - 45 mm = 6 teeth
Ø 50 - 75 mm = 8 teeth
Ø 76 - 105 mm = 12 teeth

Ø mm	Examples for application Ref. J.20.1121 and J.20.1121 A
25 30 35	Sanitary and heating pipes
40 45 50	Sanitary drain pipes, water and heating pipes with insulation
55 58	Build in lamps
60	Cover for cable opening
63	Switch box
65	Hollow wall boxes 65 mm
68	Hollow wall boxes 68 mm
70 71	Branch boxes 70 mm
74 75	Branch boxes 74 mm
76	Build in lamps
80	Distributing box
85	
90	Build in lamps
95	
100	
105	Outgoing air pipes

Accessories

For using portable drilling machines

shank Ø 13 mm for hole saws Ø 25-105 mm Suitable centre drill see Ref. J.20.1111 or J.20.1127.	**J.20.1137**
shank SDS-PLUS for hole saws Ø 25-105 mm Suitable centre drill see Ref. J.20.1111 or J.20.1127. Use only without hammer	**J.20.1123**
HSS centre drill 8x104 mm For all sandwich materials, non-ferrous materials, plastic, wood and similiar.	**J.20.1111**
HM centre drill 8x104 mm For masonry, ceramics, auto claved aerated concrete and similiar.	**J.20.1127**
Ejector spring for centre drill (J.20.1111, J.20.1127) Pushes the core slug out of the hole saw	**J.20.1005**

For using pillar drilling machines

Morse Taper 2 for hole saws Ø 25-105 mm Suitable centre drill see Ref. J.20.1111 or J.20.1127.	**J.20.1135**
Morse Taper 3 for hole saws Ø 25-105 mm Suitable centre drill see Ref. J.20.1111 or J.20.1127.	**J.20.1136**

For using core drilling machines

Adapter for core drilling machines with Weldon shank 19 mm	**J.20.1442**
Adapter for Fein- core drilling machines with “Quick In” shank	**J.20.1443**
Adapter for Nitto-Kohki- core drilling machines with “one touch” shank	**J.20.1444**
Suitable ejector pins for above mentioned adapters (packing unit: 2 pieces)	**J.20.1160**

DRILLCROWNS

Hammer Strength Drill Crown with M16-thread connection; 202.02. basic body; long model

crown execution: tough, high strength crown base; stable, break-intensive hard-metal edges

machine:
- percussion drill
- drill hammer with SDS-plus admission until 50 kN power
- for drill crown from 65 mm, machine power min 600 W

order-no.	packaging unit	diameter (mm)	working length (mm)	total length (mm)
K.202.02.250	1	25	55	70
K.202.02.350	1	35	55	70
K.202.02.400	1	40	55	70
K.202.02.500	1	50	55	70
K.202.02.650	1	65	55	70
K.202.02.800	1	80	55	70
K.202.02.900	1	90	55	70
K.202.02.100	1	100	55	70

apply on:
concrete,
stone,
stonework

used for:
switch doses, distributor boxes as well as water-, flow- and heater pipes

202.12. complete; with admission shank and centre drill

order-no.	packaging unit	diameter (mm)	working length (mm)	total length (mm)
with 6-squared admission shank 202.12.				
K.202.12.251	1	25	55	160
K.202.12.301	1	30	55	160
K.202.12.401	1	40	55	160
K.202.12.501	1	50	55	160
K.202.12.651	1	65	55	160
K.202.12.801	1	80	55	160
K.202.12.901	1	90	55	160
K.202.12.100	1	100	55	160
with SDS-plus admission shank 202.12.				
K.202.12.252	1	25	55	175
K.202.12.302	1	30	55	175
K.202.12.402	1	40	55	175
K.202.12.502	1	50	55	175
K.202.12.652	1	65	55	175
K.202.12.802	1	80	55	175
K.202.12.902	1	90	55	175
K.202.12.102	1	100	55	175

Diamond Drill Crown with M16 thread connection; 208.02. basic body

apply on:
concrete, stone, stonework

used for:
switch doses, distributor boxes as well as water-, flow- and heater pipes

crown exeecution: high-strength crown base with selected, high-quality diamond-segments

machine: percussion drill and drill hammer; use without switched on beat and hammer fuction !

order-no.	packaging unit	diameter (mm)	number of segments	working length (mm)	total length (mm)
K.208.02.650	1	65	3	60	75
K.208.02.680	1	68	3	60	75
K.208.02.800	1	80	4	60	75
K.208.02.820	1	82	4	60	75

Core Drills

Tungsten-carbide tipped 40 MM with universal shank fitting 19 mm and cutting depth 40 mm

SUITABLE FOR: Alfra (incl. Rota-Quick), BDS (incl. Keyless), Bux, Ruko, Magnetor, Euroboor, Jancy, Hougen, Magtron, Promag, Rotabroach, Nitto-One-Touch.

Ref. J.20.1315

Ø mm	Ø mm	Ø mm	Ø mm	Ø mm
12	23	34	45	56
13	24	35	46	57
14	25	36	47	58
15	26	37	48	59
16	27	38	49	60
17	28	39	50	61
18	29	40	51	62
19	30	41	52	63
20	31	42	53	64
21	32	43	54	65
22	33	44	55	

Important:
Article J.20.1316 is still available with Weldon-shank 19 mm.
If you use a Nitto-One-Touch or Alfra Rota-Quick machine please inform us so we send universal shank fitting only.

Accessories for Ref. J.20.1315

Tool holder without internal cooling

Core drill exchange takes place by opening/ fastening two allen screws.

Morse taper no.2	Weldon 19 mm	Ref. J.20.1283
Morse taper no.3	Weldon 19 mm	Ref. J.20.1293

Tool holder with internal cooling

Core drill exchange takes place by opening/ fastening two allen screws.

Morse taper no.2	Weldon 19 mm	Ref. J.20.1287
Morse taper no.3	Weldon 19 mm	Ref. J.20.1289

Ejector pins

packing unit: 2 pieces

for Ø 12-17 mm (6.34 x 90 mm)	Ref. J.20.1149
for Ø 18-65 mm (7.98 x 90 mm)	Ref. J.20.1151

Tungsten-carbide tipped 55 MM

Universal shank fitting 19 mm + Weldon shank 32 mm
Cutting depth 55 mm

SUITABLE FOR: Alfra (incl. Rota-Quick), BDS (incl. Keyless), Bux, Ruko, Magnetor, Euroboor, Jancy, Hougen, Magtron, Promag, Rotabroach, Nitto-One-Touch.

Ref. J.20.1316

Ø mm	Ø mm	Ø mm	Ø mm	Ø mm
12	27	42	57	80
13	28	43	58	85
14	29	44	59	90
15	30	45	60	95
16	31	46	61	100
17	32	47	62	105
18	33	48	63	110
19	34	49	64	115
20	35	50	65	120
21	36	51	66	125
22	37	52	67	130
23	38	53	68	135
24	39	54	69	140
25	40	55	70	145
26	41	56	75	150

From diameter 61 mm = Weldon shank 32 mm. On request diameter 61-65 mm also available with universal shank fitting 19 mm.

Important:
Article J.20.1316 is still available with Weldon-shank 19 mm.
If you use a Nitto-One-Touch or Alfra Rota-Quick machine please inform us so we send universal shank fitting only.
Diameter larger than 100 mm should be used only on Heavy-Duty machines over 5 hp, such as radial drilling-, boring-, milling machines etc.
Morse taper 4 strongly recommended.

Accessories for Ref. J.20.1316

Tool holder without internal cooling

Core drill exchange takes place by opening/ fastening two allen screws.

Morse taper no.2	Weldon 19 mm	for Ø 12-65 mm	Ref. J.20.1283
Morse taper no.3	Weldon 19 mm	for Ø 12-65 mm	Ref. J.20.1293
Morse taper no.3	Weldon 32 mm	for Ø 61-150 mm	Ref. J.20.1286

Tool holder with internal cooling

Core drill exchange takes place by opening/ fastening two allen screws.
Morse taper 4 recommended Ø 120 -150 mm.

Morse taper no.2	Weldon 19 mm	for Ø 12-65 mm	Ref. J.20.1287
Morse taper no.3	Weldon 19 mm	for Ø 12-65 mm	Ref. J.20.1289
Morse taper no.3	Weldon 32 mm	for Ø 61-150 mm	Ref. J.20.1290
Morse taper no.4	Weldon 32 mm	for Ø 61-150 mm	Ref. J.20.1292

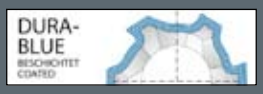
Ejector pins

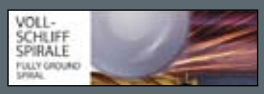
packing unit: 2 pieces

for Ø 12-17 mm (6.34 x 102 mm)	Ref. J.20.1271
for Ø 18-65 mm (7.98 x 105 mm)	Ref. J.20.1273
for Ø 61-150 mm (7.98 x 124 mm)	Ref. J.20.1272

DURA BLUE 30 MM

Universal shank fitting 19 mm + Weldon Shank 32 mm
Cutting depth 30 mm





SUITABLE FOR: Alfra (incl. Rota-Quick), BDS (incl. Keyless), Bux, Ruko, Magnetor, Euroboor, Jancy, Hougen, Magtron, Promag, Rotabroach, Nitto-One-Touch.

Ref. J.20.1312

Ø mm	Ø mm	Ø mm	Ø mm	Ø mm
12	23	34	45	56
13	24	35	46	57
14	25	36	47	58
15	26	37	48	59
16	27	38	49	60
17	28	39	50	61
18	29	40	51	62
19	30	41	52	63
20	31	42	53	64
21	32	43	54	65
22	33	44	55	

From 61 mm = Weldon shank 32 mm. On request diameter 61-65 mm also available with universal shank fitting 19 mm.

Important:
Article J.20.1213 is still available with Weldon shank 19 mm. If you need these articles for Nitto One-Touch or Alfra Rota-Quick quick-change system please inform us so we send only universal shank fitting.

Accessories for Ref. J.20.1312

Tool holder without internal cooling

Core drill exchange takes place by opening/ fastening two allen screws.

Morse taper no.2	Weldon 19 mm	for Ø 12-60 mm	Ref. J.20.1283
Morse taper no.3	Weldon 19 mm	for Ø 12-60 mm	Ref. J.20.1293
Morse taper no.3	Weldon 32 mm	for Ø 61-65 mm	Ref. J.20.1286

Tool holder with internal cooling

Core drill exchange takes place by opening/ fastening two allen screws.

Morse taper no.2	Weldon 19 mm	for Ø 12-60 mm	Ref. J.20.1287
Morse taper no.3	Weldon 19 mm	for Ø 12-60 mm	Ref. J.20.1289
Morse taper no.3	Weldon 32 mm	for Ø 61-65 mm	Ref. J.20.1290

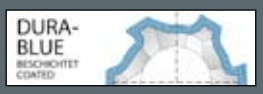
Ejector pins

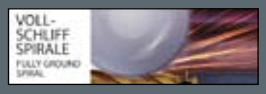
packing unit: 2 pieces

for Ø 12-60 mm (6.34 x 77 mm)	Ref. J.20.1261

DURA BLUE 55 MM

Universal shank fitting 19 mm + Weldon Shank 32 mm
Cutting depth 55 mm





SUITABLE FOR: Alfra (incl. Rota-Quick), BDS (incl. Keyless), Bux, Ruko, Magnetor, Euroboor, Jancy, Hougen, Magtron, Promag, Rotabroach, Nitto-One-Touch.

Ref. J.20.1313

Ø mm	Ø mm	Ø mm	Ø mm	Ø mm
12	23	34	45	56
13	24	35	46	57
14	25	36	47	58
15	26	37	48	59
16	27	38	49	60
17	28	39	50	61
18	29	40	51	62
19	30	41	52	63
20	31	42	53	64
21	32	43	54	65
22	33	44	55	

From 61 mm = Weldon shank 32 mm. On request diameter 61-65 mm also available with universal shank fitting 19 mm.

Important:
Article J.20.1213 is still available with Weldon shank 19 mm. If you need these articles for Nitto One-Touch or Alfra Rota-Quick quick-change system please inform us so we send only universal shank fitting.

Accessories for Ref. J.20.1313

Tool holder without internal cooling

Core drill exchange takes place by opening/ fastening two allen screws.

Morse taper no.2	Weldon 19 mm	for Ø 12-60 mm	Ref. J.20.1283
Morse taper no.3	Weldon 19 mm	for Ø 12-60 mm	Ref. J.20.1293

Tool holder with internal cooling

Core drill exchange takes place by opening/ fastening two allen screws.

Morse taper no.2	Weldon 19 mm	for Ø 12-60 mm	Ref. J.20.1287
Morse taper no.3	Weldon 19 mm	for Ø 12-60 mm	Ref. J.20.1289

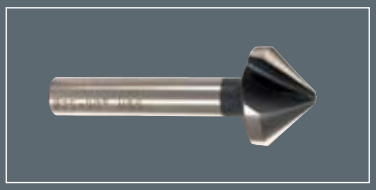
Ejector pins

packing unit: 2 pieces

for Ø 12-60 mm (6.34 x 102 mm) Ref. J.20.1271

Countersink

Precision - Countersink



DIN 335 C 90 degrees
Manufactured of high-speed steel DMo5
Manufactured of high-speed steel EMo5 Co5

- 3-cutting edges-geometry
- Radial- and axial relief-grinded
- Parallel shank, tolerance h8
- Chatter-free operation
- No tooling marks
- Accurate centreing
- The countersink is suitable for almost all materials
- Excellent chip clearance
- For sinkings according to DIN 74 AF/BF and 75 AF/BF
- Regrindable

Qualität	Ref.	Head ø	Shank ø	Smallest ø	l—mm—l
HSS	M.1030060	6.0 mm	5 mm	1.5 mm	45
HSS	M.1030063	6.3 mm	5 mm	1.5 mm	45
HSS	M.1030080	8.0 mm	6 mm	2.0 mm	50
HSS	M.1030083	8.3 mm	6 mm	2.0 mm	50
HSS	M.1030100	10.0 mm	6 mm	2.5 mm	50
HSS	M.1030104	10.4 mm	6 mm	2.5 mm	50
HSS	M.1030124	12.4 mm	8 mm	2.8 mm	56
HSS	M.1030165	16.5 mm	10 mm	3.2 mm	60
HSS	M.1030205	20.5 mm	10 mm	3.5 mm	63
HSS	M.1030250	25.0 mm	10 mm	3.8 mm	67
HSS	M.1030310	31.0 mm	12 mm	4.2 mm	71
HSS	M.1030400	40.0 mm	13 mm	6.5 mm	80
HSS	M.1030500	50.0 mm	13 mm	12.0 mm	85
HSS/Co	M.2030060	6.0 mm	5 mm	1.5 mm	45
HSS/Co	M.2030063	6.3 mm	5 mm	1.5 mm	45
HSS/Co	M.2030080	8.0 mm	6 mm	2.0 mm	50
HSS/Co	M.2030083	8.3 mm	6 mm	2.0 mm	50
HSS/Co	M.2030100	10.0 mm	6 mm	2.5 mm	50
HSS/Co	M.2030104	10.4 mm	6 mm	2.5 mm	50
HSS/Co	M.2030124	12.4 mm	8 mm	2.8 mm	56
HSS/Co	M.2030165	16.5 mm	10 mm	3.2 mm	60
HSS/Co	M.2030205	20.5 mm	10 mm	3.5 mm	63
HSS/Co	M.2030250	25.0 mm	10 mm	3.8 mm	67
HSS/Co	M.2030310	31.0 mm	12 mm	4.2 mm	71
HSS/Co	M.2030400	40.0 mm	13 mm	6.5 mm	80

Precision - Countersink Set

DIN 335 C 90 degrees
In industrial steel-case
Manufactured of high-speed steel DMo5
Manufactured of high-speed steel EMo5 Co5
• 3-cutting edges-geometry
• Radial- and axial relief-grinded
• Parallel shank, tolerance h8
• Chatter-free operation
• No tooling marks
• Accurate centreing
• The countersink is suitable for almost all materials
• Excellent chip clearance
• For sinkings according to DIN 74 AF/BF and 75 AF/BF
• Regrindable

Quality	Ref.	Countersink-Range ø	Content
HSS	M.1030001	6.0 - 19.0 mm	ø 6.0; ø 8.0; ø 10.0; ø 11.5; ø 15.0; ø 19.0 mm
HSS	M.1030004	6.0 - 25.0 mm	ø 6.0; ø 8.0; ø 10.0; ø 11.5; ø 15.0; ø 19.0; ø 25.0 mm
HSS	M.1030002	6.3 - 20.5 mm	ø 6.3; ø 8.3; ø 10.4; ø 12.4; ø 16.5; ø 20.5 mm
HSS	M.1030003	6.3 - 25.0 mm	ø 6.3; ø 8.3; ø 10.4; ø 12.4; ø 16.5; ø 20.5; ø 25.0 mm
HSS/Co	M.2030001	6.0 - 19.0 mm	ø 6.0; ø 8.0; ø 10.0; ø 11.5; ø 15.0; ø 19.0 mm
HSS/Co	M.2030004	6.0 - 25.0 mm	ø 6.0; ø 8.0; ø 10.0; ø 11.5; ø 15.0; ø 19.0; ø 25.0 mm
HSS/Co	M.2030002	6.3 - 20.5 mm	ø 6.3; ø 8.3; ø 10.4; ø 12.4; ø 16.5; ø 20.5 mm
HSS/Co	M.2030003	6.3 - 25.0 mm	ø 6.3; ø 8.3; ø 10.4; ø 12.4; ø 16.5; ø 20.5; ø 25.0 mm

TIN Precision - Countersink Set

DIN 335 C 90 degrees
In industrial steel-case
Manufactured of high-speed Steel DMo5
Manufactured of high-speed steel EMo5 Co5
titanium-nitride coated
• Increased hardness at the cutting lips
• 3-cutting edges-geometry
• Radial- and axial relief-grinded
• Parallel shank, tolerance h8
• Chatter-free operation
• No tooling marks
• Accurate centreing
• The countersink is suitable for tough materials
• Excellent chip clearance
• For sinkings according to DIN 74 AF/BF and 75 AF/BFF

Qualität	Ref.	Countersink-Range ø	Content
HSS/TIN	M.3030001	6.0 - 19.0 mm	ø 6.0; ø 8.0; ø 10.0; ø 11.5; ø 15.0; ø 19.0 mm
HSS/TIN	M.3030004	6.0 - 25.0 mm	ø 6.0; ø 8.0; ø 10.0; ø 11.5; ø 15.0; ø 19.0; ø 25.0 mm
HSS/TIN	M.3030002	6.3 - 20.5 mm	ø 6.3; ø 8.3; ø 10.4; ø 12.4; ø 16.5; ø 20.5 mm
HSS/TIN	M.3030003	6.3 - 25.0 mm	ø 6.3; ø 8.3; ø 10.4; ø 12.4; ø 16.5; ø 20.5; ø 25.0 mm
HSS/Co/TIN	M.4030001	6.0 - 19.0 mm	ø 6.0; ø 8.0; ø 10.0; ø 11.5; ø 15.0; ø 19.0 mm
HSS/Co/TIN	M.4030004	6.0 - 25.0 mm	ø 6.0; ø 8.0; ø 10.0; ø 11.5; ø 15.0; ø 19.0; ø 25.0 mm
HSS/Co/TIN	M.4030002	6.3 - 20.5 mm	ø 6.3; ø 8.3; ø 10.4; ø 12.4; ø 16.5; ø 20.5 mm
HSS/Co/TIN	M.4030003	6.3 - 25.0 mm	ø 6.3; ø 8.3; ø 10.4; ø 12.4; ø 16.5; ø 20.5; ø 25.0 mm

Countersink with cross hole

Precision - Countersink with cross hole; 90 degrees

Manufactured of high-speed steel DMo5
Manufactured of high-speed steel EMo5 Co5
- 1-cutting edge geometry
- Axial relief-grinded
- Parallel shank, tolerance h8
- Chatter-free operation
- No tooling marks
- Accurate centreing
- The countersink is suitable for almost all materials
- Excellent chip clearance
- Regrindable

Quality	Ref.	Countersink-Range ø	Smallest ø	Shank ø	l—mm—l
HSS	M.1070000	1.0 - 4.0 mm	1.0 mm	6 mm	46
HSS	M.1070001	2.0 - 5.0 mm	2.0 mm	6 mm	45
HSS	M.1070022	5.0 - 10.0 mm	4.0 mm	6 mm	48
HSS	M.1070002	5.0 - 10.0 mm	4.0 mm	8 mm	48
HSS	M.1070003	10.0 - 15.0 mm	8.0 mm	10 mm	65
HSS	M.1070004	15.0 - 20.0 mm	11.0 mm	12 mm	85
HSS	M.1070005	20.0 - 25.0 mm	16.0 mm	15 mm	95
HSS	M.1070006	25.0 - 30.0 mm	21.0 mm	15 mm	100
HSS	M.1070007	30.0 - 35.0 mm	26.0 mm	15 mm	110
HSS	M.1070008	35.0 - 40.0 mm	31.0 mm	15 mm	120
HSS/Co	M.2070001	2.0 - 5.0 mm	2.0 mm	6 mm	45
HSS/Co	M.2070022	5.0 - 10.0 mm	4.0 mm	6 mm	48
HSS/Co	M.2070002	5.0 - 10.0 mm	4.0 mm	8 mm	48
HSS/Co	M.2070003	10.0 - 15.0 mm	8.0 mm	10 mm	65
HSS/Co	M.2070004	15.0 - 20.0 mm	11.0 mm	12 mm	85

Precision - Countersink Set with cross hole; 90 degrees

In industrial steel-case
Manufactured of high-speed steel DMo5
Manufactured of high-speed steel EMo5 Co5
- 1-cutting edge geometry
- Axial relief-grind
- Parallel shank, tolerance h8
- Chatter-free operation
- No tooling marks
- Accurate centreing
- The countersink is suitable for almost all materials
- Excellent chip clearance
- Regrindable

Quality	Ref.	Countersink-Range ø	Content
HSS	M.1070100	2.0 - 20.0 mm	ø 2-5; ø 5-10; ø 10-15, ø 15-20 mm
HSS	M.1070200	2.0 - 25.0 mm	ø 2-5; ø 5-10; ø 10-15, ø 15-20; ø 20-25 mm
HSS/Co	M.2070100	2.0 - 20.0 mm	ø 2-5; ø 5-10; ø 10-15, ø 15-20 mm

Step Drills

Step Drill, 2 mm

Precision - Step Drill 2 mm rising

Manufactured of high-speed steel DMo5
titanium-nitride coated
- Up to 5 mm gauge
- Radial- and axial relief-grinded
- 2-cutting edges-geometry, straight fluted
- Parallel shank
- Stepless drilling in thinnest sheets without pre-drilling
- Burr-free drilling without deformation of the sheet
- The Step Drill drills and simultaneously deburres with the following step
- Laserscaled in the flute to see the reached diameter
- Best drilling results by using the lubrication paste
- Regrindable

Quality	Ref.	Drill-Range ø	Shank ø	Steps	l—mm—l	Cutting lips
HSS	M.1140411	4 - 12 mm	6 mm	5	69	2
HSS	M.1140420	4 - 20 mm	8 mm	9	75	2
HSS	M.1140424	4 - 24 mm	10 mm	11	83	2
HSS	M.1140630	6 - 30 mm	10 mm	13	95	2
HSS/TIN	M.3140411	4 - 12 mm	6 mm	5	69	2
HSS/TIN	M.3140420	4 - 20 mm	8 mm	9	75	2
HSS/TIN	M.3140424	4 - 24 mm	10 mm	11	83	2
HSS/TIN	M.3140630	6 - 30 mm	10 mm	13	95	2

Step Drill Set, 2 mm

Precision - Step Drill Set 2 mm rising

In industrial steel-case
Manufactured of high-speed steel DMo5
titanium-nitride coated
- Up to 5 mm gauge
- Radial- and axial relief-grinded
- 2-cutting edges-geometry, straight fluted
- Parallel shank
- Stepless drilling in thinnest sheets without pre-drilling
- Burr-free drilling without deformation of the sheet
- The Step Drill drills and simultaneously deburres with the following step
- Laserscaled in the flute to see the reached diameter
- Best drilling results by using the lubrication paste
- Regrindable

Quality	Ref.	Drill-Range ø	Content ø
HSS	M.1140003	4 - 30 mm	ø 4 - 20 mm; ø 6 - 30 mm; Lubrication paste
HSS	M.1140010	4 - 30 mm	ø 4 - 12 mm; ø 4 - 20 mm; ø 6 - 30 mm; Lubrication paste
HSS/TIN	M.3140003	4 - 30 mm	ø 4 - 20 mm; ø 6 - 30 mm; Lubrication paste
HSS/TIN	M.3140010	4 - 30 mm	ø 4 - 12 mm; ø 4 - 20 mm; ø 6 - 30 mm; Lubrication paste

General terms and conditions of delivery and payment • E. Wittmann machines & tools

1. General / Scope of application

1.1 Our terms and conditions of delivery and payment shall apply exclusively. We do not accept any Buyer's terms and conditions of delivery and payment contrary hereto or deviating herefrom, or relating to matters which are not regulated in our terms and conditions of delivery and payment unless we have expressly agreed in writing. Our terms and conditions of delivery and payment shall also apply if we effect the delivery to the Buyer without reservation in full awareness of such contrary or diverging Buyer's terms and conditions or relating to matters not laid down herein,.

1.2 All agreements which are made between us and the Buyer for the purpose of performing a contract are put into writing in the contract and these conditions of delivery and payment.

1.3 Our terms and conditions of delivery and payment shall only apply to an entrepreneur as defined in Article 14 BGB (German Civil Code).

1.4 Our terms and conditions of delivery and payment shall also apply to repeat orders.

2. Offer / Offer documents

2.1 Our offer shall not be binding, unless we have made a deviating agreement.

2.2 Illustrations, drawings, cost estimates, and other documents relating to products, applications or projects shall remain our property and shall be subject to our copyright even if we place them at the Buyer's disposal. Without our express prior written consent, they may be neither reproduced nor made accessible to third parties.

3. Prices / Terms of payment

3.1 Unless otherwise agreed, our prices shall be quoted „ex works" (Incoterms 2000), exclusive of packing and transportation costs. These shall be charged for separately.

3.2 Statutory value-added tax is not included in our quoted prices. It will be shown separately in the invoice in the statutory amount applicable at the invoicing date.

3.3 Discounts may be deducted only by special written agreement.

3.4 Unless otherwise agreed, the purchase price shall be due for payment net (without any deduction) within 30 days of the date of the invoice. Should the Buyer fail to pay on due date, we are entitled to charge default interest at a rate 8% higher than each published base rate (Basiszinssatz, Article 247 BGB (German Civil Code)).

3.5 For tools made to drawings, special designs or projects, payment shall be made as follows:
- 1/3 advance payment upon receipt of the acknowledgement of the order;
- 1/3 upon receipt of the delivery;
- 1/3 fourteen (14) days after acceptance

3.6 The Buyer is only permitted to offset against our claims if its counterclaims have been confirmed by final court judgement, are uncontested or acknowledged by us. The Buyer may exercise a right to withhold payment only if its counterclaim is based on the same contractual relationship.

4. Delivery / Delivery time

4.1 Unless otherwise agreed, delivery shall be effected ex works (Incoterms 2000) place named in our offer or acceptance or, if no place of destination is indicated in our offer/acceptance, ex works Spangenberg.

4.2 The time of delivery we have specified or agreed shall not commence before all technical questions have been clarified.

4.3 Furthermore, the fulfilment of our delivery obligation shall be conditional upon the timely and proper fulfilment of the Buyer's obligations, in particular adherence to the agreed terms of payment. We reserve the defense of non-performance of the contract.

4.4 Should the Buyer be in default of acceptance or infringe other obligations to cooperate, we are entitled to demand compensation to this extent for the loss or damage we have incurred, including any additional expenses. The right to claim higher damages is reserved.

4.5 If the conditions set forth in Article 4.3 are fulfilled, the risk of accidental loss, destruction or deterioration of the purchased goods passes to the Buyer at the date of default of acceptance or default of the debtor.

4.6 If failure to make delivery by the agreed date is due to force majeure, e.g. mobilization, war, riot or similar events such as strikes or lockouts, the delivery period shall be extended by the duration of the events causing the delay, insofar as it can be proved that these obstacles affect completion or delivery more than slightly. This shall also apply if such circumstances occur with our suppliers.

4.7 We shall be released from our delivery obligation if the correct goods ordered for performing the contract have not been delivered to us in due time.

4.8 Partial deliveries are permitted to an acceptable extent.

4.9 Unless otherwise agreed and if it is acceptable for the Buyer in each individual case, we shall be entitled to exceed or go below the agreed quantity to be delivered by ±10%. The Buyer shall then pay for the quantity actually delivered.

4.10 We shall be liable for delays in delivery in accordance with statutory provisions if the respective contract of sale specifies fixed-date delivery as defined by Article 361 BGB (German Civil Code) or Article 376 HGB (German Commercial Code).

4.11 We shall also be liable in accordance with statutory provisions if the delay in delivery is caused by an intentional or grossly negligent breach of contract for which we are responsible. We shall also be held responsible for a fault on the part of our representatives or vicarious agents.

4.12 If the delay in delivery has been caused merely by a simple fault and there is no mandatory liability for injury to life, body or health, our liability for loss or damage caused by delays shall be limited as follows: for each completed week of delay, the Buyer may demand 0.5 per cent of the price for the part of the delivery that could not be put into useful operation due to the delay, but not more than 5 per cent altogether. This does not entail a change in the burden of proof to the prejudice of the Buyer. The Buyer's statutory right to rescind the contract shall remain unaffected.

4.13 If delivery is delayed on grounds for which the Buyer is responsible, the Buyer may be charged for storage to the amount of 0.5 per cent of the price of the goods to be delivered for each month commenced, but not more than 5 per cent altogether. After expiry of a reasonable period of grace, we shall have the right to dispose otherwise of the goods to be delivered and to make delivery to the Buyer at a later date. The contracting parties shall be at liberty to furnish proof of higher, lower or no storage costs. The statutory rights to rescind the contract and to claim for damages are not affected.

5. Passing of risk

Unless otherwise agreed, delivery shall be deemed agreed „ex works" (Incoterms 2000), even in cases where we have taken out transport insurance for shipment to the German border at our expense.

6. Defects

For defects, we shall be liable as follows:

6.1 The Buyer agrees with us that if there is entitlement to subsequent performance (repairs or new delivery), the less expensive of the two possibilities is to be selected, provided that the Buyer suffers no disadvantage thereby.

6.2 Claims for defects shall be subject to a limitation period of twelve (12) months from the date of passing of risk (Paragraph 5). This shall not apply in so far as pursuant to Article 438 para. 1, clause 2 BGB (Buildings and objects used in buildings), Article 479 para. 1 BGB (Right of recourse), Article 634 a BGB (Construction defects) and Article 438 para. 2 BGB (Fraudulent intent) longer periods are provided for.

6.3 The Buyer shall notify us immediately in writing of defects, but at the latest within seven days after performance (obvious defects) or the date of discovering the defect. Otherwise claims based on defects will be excluded.

6.4 In the event of a notice of defects, the Buyer may withhold payments to an amount which is reasonably commensurate with the defects which have occurred. The Buyer may withhold payments only if a notice of defects is justified beyond any doubt. If a notice of defect is not justified, we are entitled to compensation from the Buyer for the expenses we thereby incurred.

6.5 First we shall always be given the opportunity to provide subsequent performance within a reasonable period of time.

6.6 Should subsequent performance fail, the Buyer may rescind the contract or reduce the price without prejudice to any claims for damages that it may have.

6.7 There is no entitlement to claims based on defects due to natural wear and tear or to damage that occurs after the passage of risk as a result of incorrect or negligent handling, excessive strain, unsuitable working materials, or due to special external influences which were not assumed in the contract. Should the Buyer or third parties improperly perform changes or repairs, no claims based on defects shall exist for these or for any consequential loss or damage resulting therefrom.

6.8 Buyer's claims for expenses necessary for the purpose of subsequent performance, particularly transport, tolls, labour and material costs, are excluded if expenses increase because the delivered goods have subsequently been brought to a place other than the Buyer's place of business, unless such relocation is required for the use for which the goods are intended.

6.9 The Buyer's statutory rights of recourse against us shall exist only in so far as the Buyer has made no agreement with its customer exceeding the claims for defects allowed by German law.

6.10 Paragraph 8 shall apply to claims for damages. Claims over and above these claims based on defects other than those regulated in this Paragraph or in Paragraph 8 are excluded.

7. Industrial property rights and copyrights, defects of title

Unless otherwise agreed, we are obligated to effect delivery free of thirdparty industrial property rights and copyrights (hereinafter referred to as „industrial property rights") only with respect to the country where delivery is made. Should a third party assert justified claims against the Buyer for an infringement of industrial property rights by deliveries effected by us and used as stipulated in the contract, we shall be liable to the Buyer within the period of time set forth in Par.6.2 as follows:

7.1 At our option and at our expense, we shall either acquire the right to use the deliveries concerned, or modify them so that the industrial property right is no longer infringed, or replace them. Should this prove impossible to do on reasonable terms, the Buyer shall have the statutory right to rescind the contract or to reduce the purchase price. Our obligation to pay damages shall be in accordance with Par. 8.

7.2 The above-mentioned obligations shall exist only if the Buyer informs us immediately in writing of the claims asserted by the third party, has not acknowledged infringement, and all defensive measures and settlement negotiations are reserved to us. Should the Buyer cease to use the delivered goods in order to reduce damages or for other important reasons, it shall point out to the third party that cessation of use cannot be construed as an acknowledgement of an infringement of industrial property rights.

7.3 The Buyer shall have no claims in so far as it is responsible for an infringement of industrial property rights.

7.4 Furthermore, Buyer's claims are excluded in so far the infringement of an industrial property right has been caused by the Buyer's special instructions, by an application not envisaged by us, by a modification of the delivered goods by the Buyer or through use together with products not delivered by us.

7.5 In the event of infringements of industrial property rights, the provisions of Paragraph 6.4, 6.5 and 6.9 shall apply accordingly to the claims of the Buyer regulated in Paragraph 7.1.

7.6 More extensive claims on the part of the Buyer or claims against us or against our vicarious agents based on defects of title other than those regulated in this Par. 7 are excluded.

8. Overall liability

8.1 We shall be liable for damages and for the refund of futile expenditure within the meaning of Article 284 BGB (hereinafter referred to as „indemnification") on grounds of defective delivered goods or services, or on grounds of a breach of any contractual or non-contractual obligation, in particular on grounds of tort, only in cases of intent or gross negligence. The above limitation of liability shall not apply in cases of injury to life, body or health pursuant to our taking over a warranty or procurement risk, a breach of essential contractual obligations or liability pursuant to the Produkthaftungsgesetz (German Product Liability Act).

8.2 Damages on grounds of violation of material contractual obligations (cardinal duties) shall be limited to damages for such loss or injury as must have been foreseeable under the circumstances at the time of execution of the contract (loss or injury typical for the type of contract), provided that there was no malicious intent or gross negligence, and that it does not involve injury to life, body or health, or the taking over of a warranty or a procurement risk.

8.3 All limitations of liability shall apply to the same extent to vicarious agents.

8.4 The foregoing provisions shall not bring about a change of the burden of proof to the prejudice of the Buyer.

9. Reservation of title

9.1 We reserve title in the delivered goods (reserved goods) until all claims against the Buyer due to us under the business relationship have been satisfied. If the value of all security interest due to us against the Buyer exceeds the amount of all secured claims by more than 10%, then, at Buyer's request, we shall release a corresponding part of the security interest.

9.2 As long as title is reserved, the Buyer shall neither pledge the goods nor assign them by way of security. Resale shall be permitted only to resellers in the ordinary course of their business and only on condition that the reseller receives payment from its customer or stipulates that title shall not pass to the customer until it has satisfied its payment obligations.

9.3 In the event of attachments, seizures or other disposals or interventions on the part of third parties, the Buyer shall notify us immediately so as to permit us to take legal action pursuant to Article 771 ZPO (German Code of Civil Procedure). In so far as the third party is not in the position to reimburse us for the judicial and non-judicial costs of a legal action pursuant to Article 771 ZPO, the Buyer shall be liable for the loss we have sustained.

9.4 The Buyer shall handle the purchased goods with care. In particular, it shall insure them sufficiently at their replacement value against damage by fire, water and theft at its own expense. Should maintenance and inspection work be necessary, the Buyer shall carry this out in due time at its own expense.

9.5 If the Buyer is in breach of its obligations, in particular if it is delay in payment, we are entitled to rescind the contract and to recover the goods. The Buyer has an obligation to return the goods. The recovery of the goods and/or the assertion of the reservation of title shall not require us to rescind the contract. Such actions or an attachment of the reserved goods by us shall not be deemed as a rescission of the contract, unless we have expressly stated this to be the case.

9.6 If the Buyer resells the purchased goods in the ordinary course of business, it hereby assigns to us all claims to an amount corresponding to the total invoiced amount (including VAT) of our payment claim, due to it from the resale against customers or third parties, regardless of whether the purchased goods have been resold unprocessed or after processing. Even after the assignment, the Buyer shall remain authorized to collect this claim. This shall not affect our right to collect the claim ourselves. However, we undertake not to collect the claim as long as the Buyer meets its obligations to pay from the proceeds received, does not default in payment and, in particular, no petition to institute insolvency proceedings has been filed and the Buyer has not ceased to make payments. Should this be the case, however, we may require the Buyer to disclose the assigned claims and the names of the debtors to us, to provide all the information needed for collection, to hand over the pertinent records, and to inform the debtors (third parties) of the assignment.

9.7 Processing or transformation of the goods bought by the Buyer shall always be deemed effected on our behalf. If the purchased goods are processed with other goods not owned by us, we shall acquire coownership of the new product in the proportion of the value of the purchased goods (total invoiced amount including VAT) to the other processed goods at the time of processing. For the rest, the product created through processing shall be subject to the same provisions as apply to purchased goods delivered with reservation of title.

9.8 If the purchased goods are inseparably mixed with other goods which are not our property, we shall acquire a share of property in the new product in the same proportion as the value of the purchased goods (total invoiced amount including VAT) has to the value of the other mixed products at the time of mixing. Should the mixture be effected in such a manner that the Buyer's goods are to be regarded as the main goods, it shall be deemed agreed that the Buyer shall assign co-ownership to us on a pro rata basis. The goods thus created in which we hold sole or joint property shall be held by the Buyer in safekeeping on our behalf.

10. Place of performance, jurisdiction, applicable law

10.1 For all rights and obligations resulting from our deliveries and services, the domicile of our company shall be the place of performance for both parties.

10.2 In transactions with entrepreneurs, the Amtsgericht (local court) Melsungen is agreed to be the place of jurisdiction for legal actions falling within the subject-matter jurisdiction of Amtsgerichte (local courts). We shall have the optional right to take legal action at the Buyer's domicile.

10.3 The contractual relationship shall be subject to the substantive law of the Federal Republic of Germany without giving effect to its conflict of laws principle.

10.4 The data provided by the Buyer shall be stored and processed by means of EDP in so far as this is permissible under Articles 28, 29 of the Bundesdatenschutzgesetz (BDSG, German Federal Data Protection Act).

WWW.WITTMANN-TOOLS.COM