BAR PEELING

2022

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INTRODUCTION

At Dormer Pramet, we offer a comprehensive line of cutting tools for a variety of applications, with representatives operating in more than 100 countries. For more than 70 years, our Pramet brand has been a reliable partner for our customers who produce metal parts by mechanical machining.

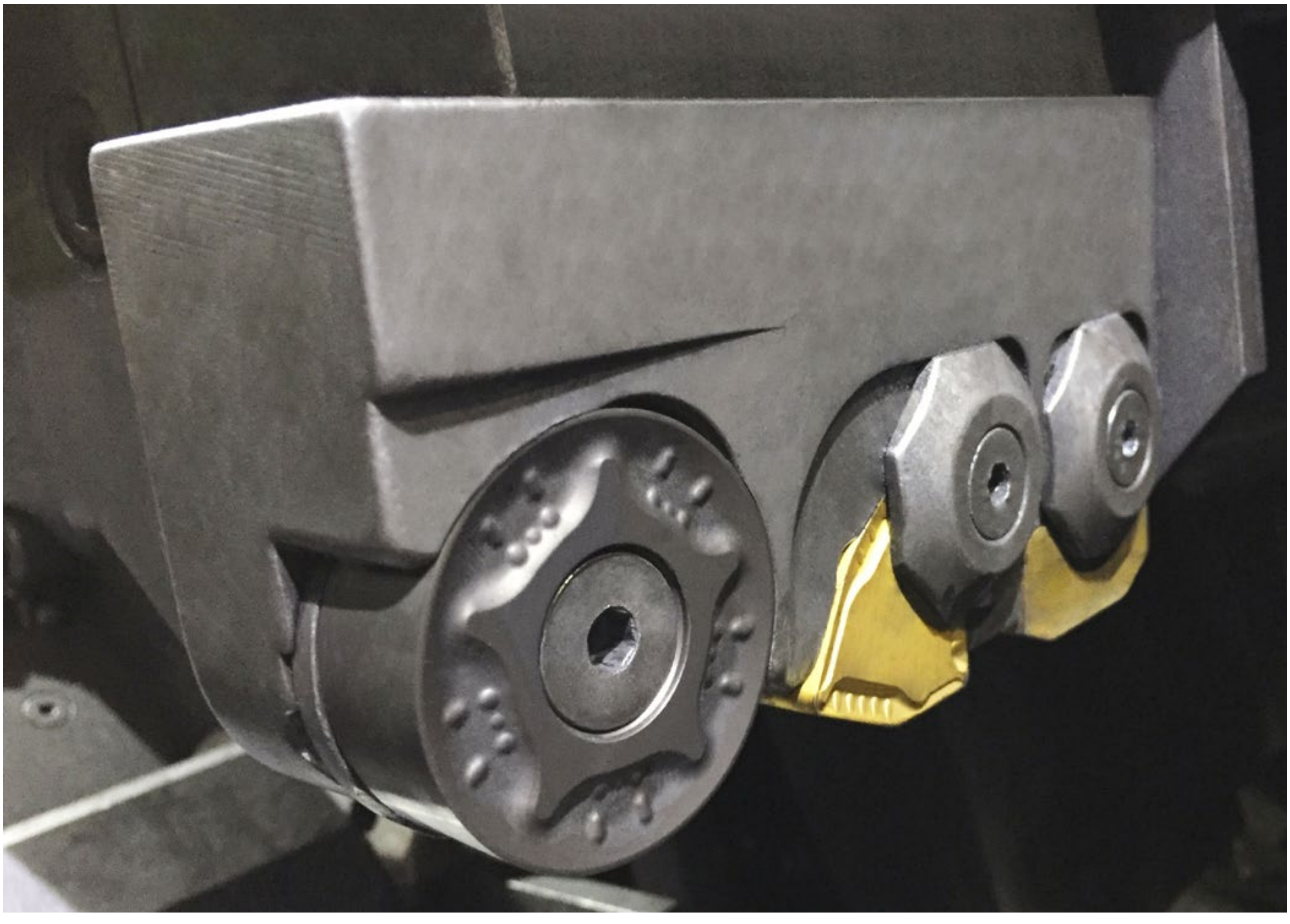
Our inserts are designed and manufactured to meet the most demanding machining processes and compete with the best manufacturers in the world. For bar peeling operations, we offer standard and special tools that ensure high efficiency, optimal surface quality and reliability for your machining applications.

Our state-of-the-art production methods for cemented carbide grades and MT-CVD and PVD coating layers, reduce edge wear and increase the tool life of our inserts. When combined with our multiple insert geometries, our customers gain a tangible cost savings in all applications.

In this catalog you will find the highest quality range of indexable inserts and cassettes that are used on machine tools of different manufacturers.

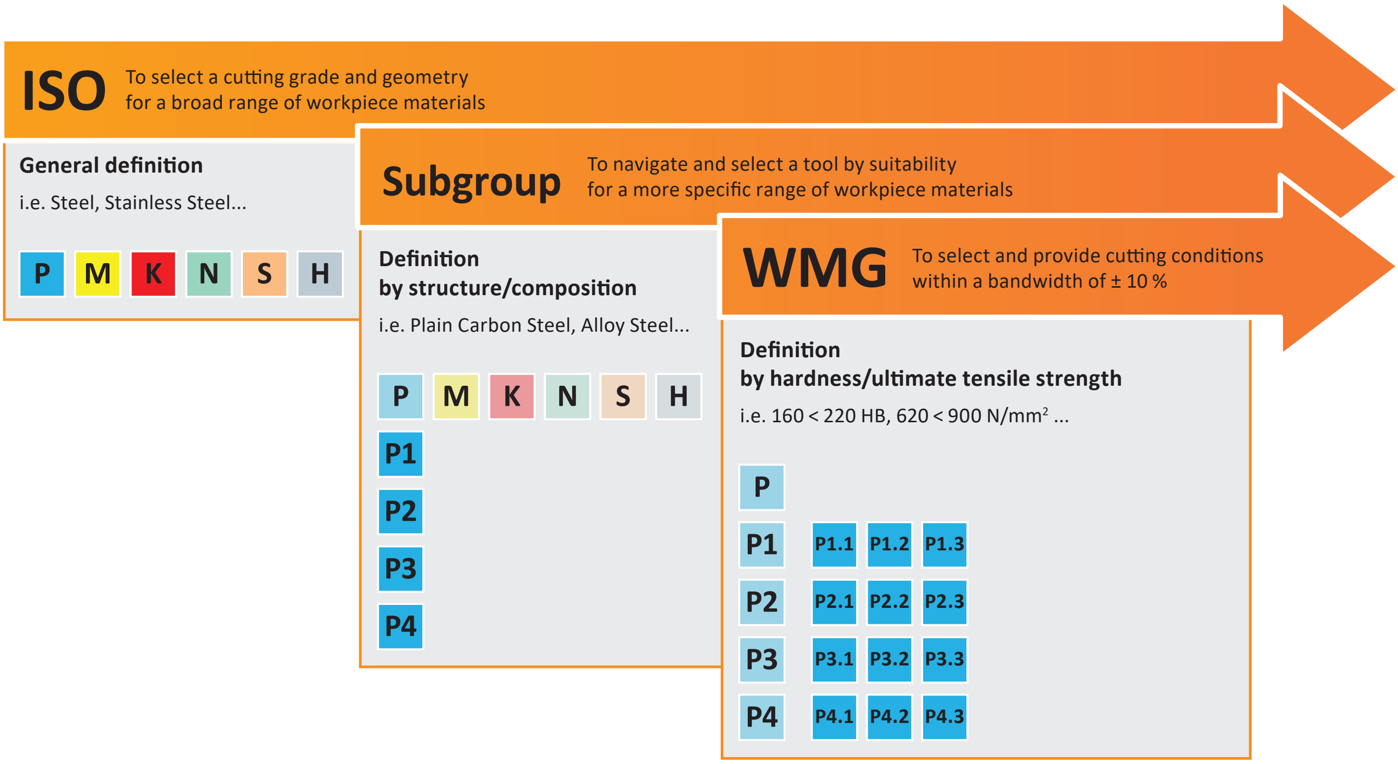
In our technical section there is detailed information about the geometry of our tools, cutting materials, calculation of machining parameters, recommended initial cutting speeds and a trouble shooting guide to help respond to the most common problems during machining.

Please contact your local Dormer Pramet sales office for further information and advice regarding our bar peeling assortment.



For more information regarding all products launched by Dormer Pramet please visit www.dormerpramet.com or contact your local sales office.

WORKPIECE MATERIAL GROUPS (WMG)



ABOUT DORMER PRAMET'S WORKPIECE MATERIAL CLASSIFICATION

Workpiece **M**aterial **G**roups (**WMG**) are used to support easy and reliable selection of the right cutting tool and starting values for machining conditions in particular applications.
Dormer Pramet classifies workpiece materials into six different coloured groups;

- **Blue**: Steel and cast steel (P-group)
- **Yellow**: Stainless steel (M-group)
- **Red**: Cast iron (K-group)
- **Green**: Non-ferrous metals (N-group)
- **Brown**: High-temperature alloys (S-group)
- **Grey**: Hardened materials (H-group)

Each of these are divided into subgroups on the basis of their structure and/or composition. For example, P-group steel and cast steel is split into four subgroups, namely;

- **P1** – Free machining steel
- **P2** – Plain carbon steel
- **P3** – Alloy steel
- **P4** – Tool steel

A final division includes material properties, such as hardness and ultimate tensile strength. This is to provide our customers with a complete tool recommendation, including starting values for cutting speed and feed.
The table on the next page includes a description of each workpiece material group, as well as examples of commonly used designations.

WMG (WORKPIECE MATERIAL GROUP)

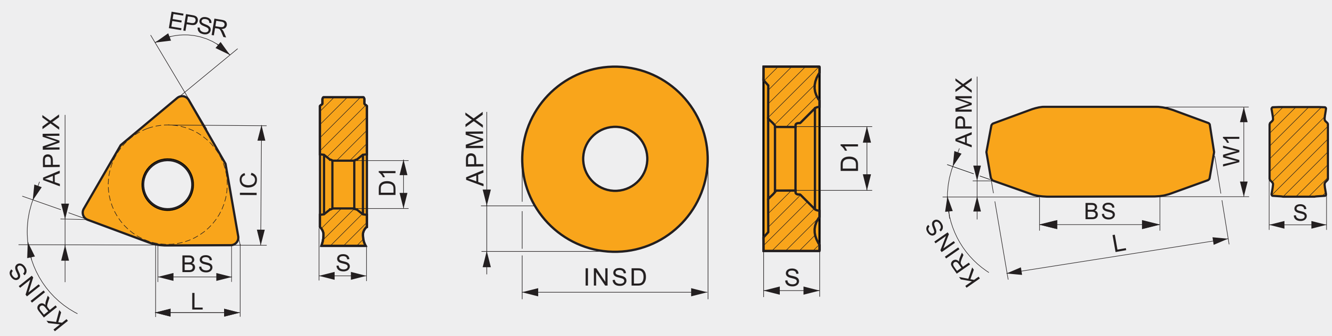
ISO group		WMG (Workpiece Material Group)			Hardness (HB or HRC)	Ultimate Tensile Strength (MPa)
P	P1	P1.1	Free machining steel (carbon steels with increased machinability)	Sulfurized	< 240 HB	≤ 830
		P1.2		Sulfurized and phosphorized	< 180 HB	≤ 620
		P1.3		Sulfurized/phosphorized and leaded	< 180 HB	≤ 620
	P2	P2.1	Plain carbon steel (steels comprised of mainly iron and carbon)	Containing <0.25 % C	< 180 HB	≤ 620
		P2.2		Containing <0.55 % C	< 240 HB	≤ 830
		P2.3		Containing >0.55 % C	< 300 HB	≤ 1030
	P3	P3.1	Alloy steel (carbon steels with an alloying content ≤ 10%)	Annealed	< 180 HB	≤ 620
		P3.2		Hardened and tempered	180 – 260 HB	> 620 ≤ 900
		P3.3			260 – 360 HB	> 900 ≤ 1240
	P4	P4.1	Tool steel (special alloy steel for tools, dies and molds)	Annealed	< 26 HRC	≤ 900
		P4.2		Hardened and tempered	26 – 39 HRC	> 900 ≤ 1240
		P4.3			39 – 45 HRC	> 1240 ≤ 1450
M	M1	M1.1	Ferritic stainless steel (straight chromium non-hardenable alloys)		< 160 HB	≤ 520
		M1.2			160 – 220 HB	> 520 ≤ 700
	M2	M2.1	Martensitic stainless steel (straight chromium hardenable alloys)	Annealed	< 200 HB	≤ 670
		M2.2		Quenched and tempered	200 – 280 HB	> 670 ≤ 950
		M2.3		Precipitation-hardened	280 – 380 HB	> 950 ≤ 1300
	M3	M3.1	Austenitic stainless steel (chromium-nickel and chromium-nickel-manganese alloys)		< 200 HB	≤ 750
		M3.2			200 – 260 HB	> 750 ≤ 870
		M3.3			260 – 300 HB	> 870 ≤ 1040
	M4	M4.1	Austenitic-ferritic (DUPLEX) or super-austenitic stainless steel		< 300 HB	≤ 990
		M4.2	Precipitation hardening austenitic stainless steel		300 – 380 HB	≤ 1320
K	K1	K1.1	Gray iron or Automotive Gray iron (GG) (iron-carbon castings with a lamellar graphite microstructure)	Ferritic or ferritic-pearlitic	< 180 HB	≤ 190
		K1.2		Ferritic-pearlictic or pearlitic	180 – 240 HB	> 190 ≤ 310
		K1.3		Pearlitic	240 – 280 HB	> 310 ≤ 390
	K2	K2.1	Malleable iron (GTS/GTW) (iron-carbon castings with a graphite-free microstructure)	Ferritic	< 160 HB	≤ 400
		K2.2		Ferritic or pearlitic	160 – 200 HB	> 400 ≤ 550
		K2.3		Pearlitic	200 – 240 HB	> 550 ≤ 660
	K3	K3.1	Ductile iron (GGG) (iron-carbon castings with a nodular graphite microstructure)	Ferritic	< 180 HB	≤ 560
		K3.2		Ferritic or pearlitic	180 – 220 HB	> 560 ≤ 680
		K3.3		Pearlitic	220 – 260 HB	> 680 ≤ 800
	K4	K4.1	Austenitic gray iron (ASTM A436) (iron-carbon alloy castings with an austenitic lamellar graphite microstructure)		< 180 HB	≤ 190
		K4.2	Austenitic ductile iron (ASTM A439 or ASTM A571) (iron-carbon alloy castings with an austenitic nodular graphite microstructure)		< 240 HB	≤ 740
		K4.3	Austempered ductile iron (ASTM A897) (iron-carbon alloy castings with an ausferrite microstructure)		< 280 HB	> 840 ≤ 980
		K4.4			280 – 320 HB	> 980 ≤ 1130
		K4.5			320 – 360 HB	> 1130 ≤ 1280
	K5	K5.1	Compacted graphite iron CGI (ASTM A842) (iron-carbon castings with a vermicular graphite structure)	Ferritic	< 180 HB	≤ 400
		K5.2		Ferritic-pearlitic	180 – 220 HB	> 400 ≤ 450
		K5.3		Pearlitic	220 – 260 HB	> 450 ≤ 500
N	N1	N1.1	Commercially pure wrought aluminium		< 60 HB	≤ 240
		N1.2	Wrought aluminium alloys	Half hard tempered	60 – 100 HB	> 240 ≤ 400
		N1.3		Full hard tempered	100 – 150 HB	> 400 ≤ 590
	N2	N2.1	Cast aluminium alloys		< 75 HB	≤ 240
		N2.2			75 – 90 HB	> 240 ≤ 270
		N2.3			90 – 140 HB	> 270 ≤ 440
	N3	N3.1	Free-cutting copper-alloys materials with excellent machining properties		–	–
		N3.2	Short-chip copper-alloys with good to moderate machining properties		–	–
		N3.3	Electrolytic copper and long-chip copper-alloys with moderate to poor machining properties		–	–
	N4	N4.1	Thermoplastic polymers		–	–
		N4.2	Thermosetting polymers		–	–
		N4.3	Reinforced polymers or composites		–	–
	N5	N5.1	Graphite		–	–
S	S1	S1.1	Titanium or titanium alloys		< 200 HB	≤ 660
		S1.2			200 – 280 HB	> 660 ≤ 950
		S1.3			280 – 360 HB	> 950 ≤ 1200
	S2	S2.1	Fe-based high-temperature alloys		< 200 HB	≤ 690
		S2.2			200 – 280 HB	> 690 ≤ 970
	S3	S3.1	Ni-based high-temperature alloys		< 280 HB	≤ 940
		S3.2			280 – 360 HB	> 940 ≤ 1200
	S4	S4.1	Co-based high-temperature alloys		< 240 HB	≤ 800
		S4.2			240 – 320 HB	> 800 ≤ 1070
H	H1	H1.1	Chilled cast iron		< 440 HB	–
	H2	H2.1	Hardened cast iron		< 55 HRC	–
		H2.2			> 55 HRC	–
	H3	H3.1	Hardened steel <55 HRC		< 51 HRC	–
		H3.2			51 – 55 HRC	–
	H4	H4.1	Hardened steel >55 HRC		55 – 59 HRC	–
		H4.2			> 59 HRC	–

CUTTING TOOL PARAMETERS ACCORDING TO ISO 13399

All cutting tools are defined by a number of parameters according to the standard ISO 13399. This list contains all the parameters used in this catalogue and their definitions.

ISO 13399 is an international cutting tool information standard. It provides dimensions and parameters in a neutral format that is independent of any particular system or company nomenclature. When cutting tools are clearly defined according to a global standard, all types of software can process the electronic data more quickly, improving the quality of communication and helping to make the exchange of information run smoothly. By supporting a common language in our cutting tool descriptions will assist this system to system communication. It will save you a significant amount of time, providing an easier gathering of high-quality data across our 40,000 solid and indexable tools. By using an ISO 13399 compliant system, there will be no need to manually interpret data and key-enter it into your system.

Examples



ISO 13399	Codes for Bar peeling assortment
L	Cutting edge length or insert length
W1	Insert width
S	Insert thickness
IC	Inscribed circle diameter
INSD	Insert diameter
BS	Wiper edge length
KRINS	Major cutting edge setting angle
EPSR	Insert included corner angle
D1	Fixing hole diameter
APMX	Depth of cut maximum

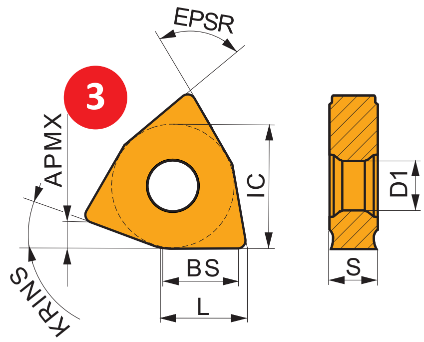
WNMJ

1

	L (mm)	S (mm)	APMX (mm)	KRINS (°)	IC (mm)	EPSR (mm)	BS (mm)
2013	20.00	13.00	8.00	25[illegible]	[illegible]1.750	85.0	15.00
2014	20.00	14.00	8.00	2[illegible]	[illegible]1.750	85.0	15.00

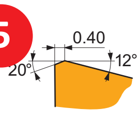
2

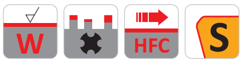
3



Product		RE (mm)	P	M	K	N	S	H	ap min (mm) 11	ap max (mm) 12	fz min (mm/tooth) 13	fn max (mm/rev) 14

4 

5 



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9

Peeling geometry PR for large depth of cut, high linear speed, wiper secondary cutting edge for unstable cutting conditions.

Product	Grade	RE	P	M	K	N	S	H	ap min	ap max	fz min	fn max
WNMJ 201380-PR	T9226	–	■						1.00	8.00	1.20	12.00
WNMJ 201480-PR	6630	–	■						1.00	8.00	1.20	12.00
	T9226		■						1.00	8.00	1.20	12.00

10 7 8

Pos.	Description
1	Designation of insert
2	Table with insert sizes [mm]
3	Schematic drawing of insert
4	Picture of representative insert
5	Profile of main cutting edge
6	Icons – specific features and cutting edge type
7	ISO code of insert
8	Grade
9	Geometry description
10	Application area of insert
11	ap min – minimal depth of cut [mm]
12	ap max – maximal depth of cut [mm]
13	fz min – minimal feed per one cassette in pealing head [mm/tooth]
14	fn max – maximal feed per one revolution of pealing head [mm/rev]

General icons

■	Primary use
◪	Possible use

P	Material group P
M	Material group M
K	Material group K
N	Material group N
S	Material group S
H	Material group H

Features

	Heavy working conditions
HFC	High feed Cutting
W	Insert with Wiper geometry

U	Universal wide range option

E	Rounded edge
P	Rounded edge with double facet
S	Rounded edge with facet

Technical pages

a_p	Depth of cut [mm]
f	Feed [mm/rev]
	Grade
(MT)CVD / PVD	Coating
V	Cutting speed
	Cutting edge profile

	Cooling
	Very high cutting speed, excellent system rigidity (stable working conditions)
	High cutting speed, high system rigidity (stable working conditions)
	High cutting speed, system rigidity slightly limited (depth of cut changing)
	Medium cutting speed, system rigidity limited (slightly interrupted cut)
	Low cutting speed, low system rigidity (interrupted cut)
	Very low cutting speed, very low system rigidity (very unstable working conditions)

BAR PEELING INSERTS

LNGF 30

12

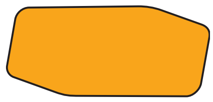
LNGF 36

12

LNGF 40

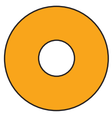
13

LNXR



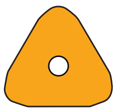
14

RNGH



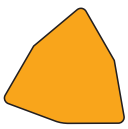
15

TNGJ



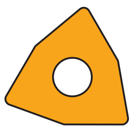
16

WNGF



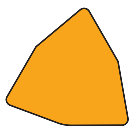
17

WNGU



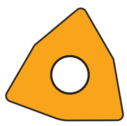
17

WNMF



18

WNMJ



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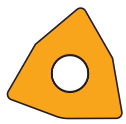
WNXJ



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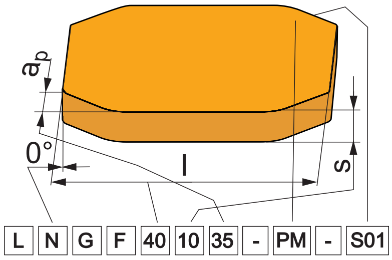
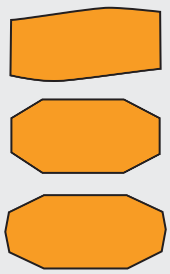
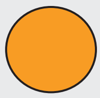
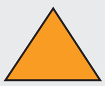
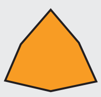
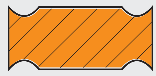
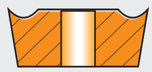
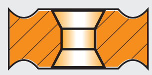
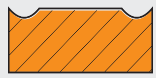
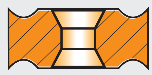


ISO	1	2	3	4
	L	N	G	F

1	
Insert shape	
L	
R	
T	
W	

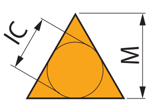
2	
Insert clearance angle	
N	
O	Special

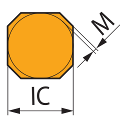
4	
Insert type	
F	
H	
J	
R	
U	
X	Special

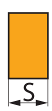
3

Tolerances

	[mm]		
	M (±)	S (±)	IC (±)
A	0.005	0.025	0.025
F	0.005	0.025	0.013
C	0.013	0.025	0.025
H	0.013	0.025	0.013
E	0.025	0.025	0.025
G	0.025	0.130	0.025
J	0.005	0.025	0.05 – 0.13
K	0.013	0.025	0.05 – 0.13
L	0.025	0.025	0.05 – 0.13
M	0.08 – 0.18	0.130	0.05 – 0.13
N	0.08 – 0.18	0.025	0.05 – 0.13
U	0.05 – 0.38	0.130	0.05 – 0.13

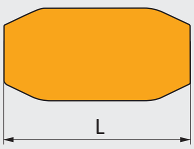


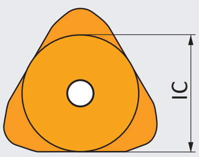


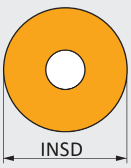


5	6	7		8 – 9		10
40	10	35	-	PM	-	S01

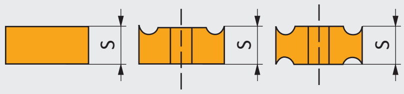
5
Insert size





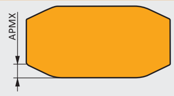


6
Insert thickness



	S [mm]
07	7.54
07	7.94
09	9.52
10	10.15
12	12.00
12	12.70
13	13.00
14	14.00
18	18.00

7
Depth of Cut



	APMX [mm]
10	1.00
15	1.50
20	2.00
25	2.50
35	3.00
40	4.00
80	8.00
12	12.00
16	16.00

Round inserts

	IC
00	[in]
MO	[mm]

8–9
Chip breaker designation

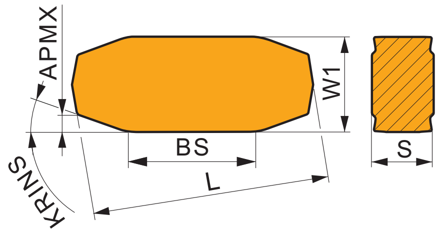
Material group ISO 513		Geometry	
P	Steel	F	Finish
M	Stainless Steel	M	Medium
S	Super alloys	R	Roughing

10
Cutting edge variant

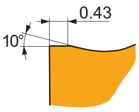
S01	For hard material
S02	For medium hardness
S03	For soft material
S04	Special

LNGF 30

	L	S	APMX	KRINS	W1	BS
	(mm)	(mm)	(mm)	(°)	(mm)	(mm)
3007	30.12	7.54	1.50	20.0	12.000	13.00



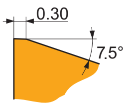
Product		RE	P	M	K	N	S	H	ap min	ap max	fz min	fn max
		(mm)							(mm)	(mm)	(mm/tooth)	(mm/rev)



W U HFC S

Peeling geometry MM for medium depth of cut, high linear speed, wiper secondary cutting edge for stable to unstable conditions.

Product	Grade	RE	P	M	K	N	S	H	ap min	ap max	fz min	fn max
LNGF 300715-MM-S01	T6310	–	■	■			◩		0.50	1.50	0.90	10.00
	T7325	–	◩	■			◩		0.50	1.50	0.90	10.00
	T9315	–	■						0.50	1.50	0.90	10.00
LNGF 300715-MM-S02	T7325	–	◩	■			◩		0.50	1.50	0.90	10.00
LNGF 300715-MM-S03	T7325	–	◩	■			◩		0.50	1.50	0.90	10.00



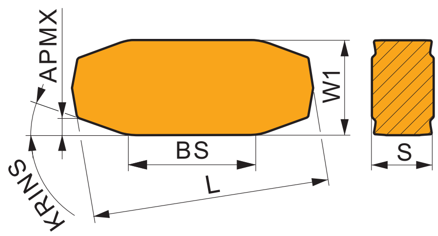
W HFC S

Peeling geometry PM with wiper secondary cutting edge for medium depth of cut, high linear speed for stable to unstable cutting conditions.

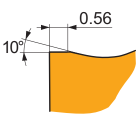
Product	Grade	RE	P	M	K	N	S	H	ap min	ap max	fz min	fn max
LNGF 300715-PM	6630	–	■	◩					0.50	1.50	0.90	10.00
	T6310	–	■	◩					0.50	1.50	0.90	10.00
	T7325	–	◩	◩					0.50	1.50	0.90	10.00
	T9226	–	■	◩					0.50	1.50	0.90	10.00
	T9315	–	■						0.50	1.50	0.90	10.00
LNGF 300715-PM-S02	T7325	–	◩	◩					0.50	1.50	0.90	10.00
LNGF 300715-PM-S03	T7325	–	◩	◩					0.50	1.50	0.90	10.00

LNGF 36

	L	S	APMX	KRINS	W1	BS
	(mm)	(mm)	(mm)	(°)	(mm)	(mm)
3612	36.50	12.00	2.00	20.0	18.000	16.00



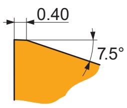
Product		RE	P	M	K	N	S	H	ap min	ap max	fz min	fn max
		(mm)							(mm)	(mm)	(mm/tooth)	(mm/rev)



W U HFC S

Peeling geometry MM with wiper secondary cutting edge for medium depth of cut, high linear speed for stable to unstable conditions.

Product	Grade	RE (mm)	P	M	K	N	S	H	ap min (mm)	ap max (mm)	fz min (mm/tooth)	fn max (mm/rev)
LNGF 361220-MM-S01	T6310	–	■	■			◩		0.60	2.00	1.15	12.00
	T7325	–	◩	■			◩		0.60	2.00	1.15	12.00
	T9315	–	■						0.60	2.00	1.15	12.00
LNGF 361220-MM-S02	T7325	–	◩	■			◩		0.60	2.00	1.15	12.00
	T9315	–	◩						0.60	2.00	1.15	12.00
LNGF 361220-MM-S03	T7325	–	◩	■			◩		0.60	2.00	1.15	12.00
	T9315	–	◩						0.60	2.00	1.15	12.00
LNGF 361220-MM-S04	H07	–		◩			■		0.60	2.00	1.15	12.00



W HFC S

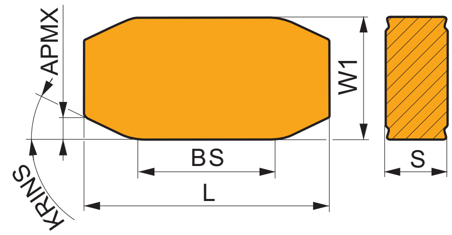
Peeling geometry PM with wiper secondary cutting edge for medium depth of cut, high linear speed for stable to unstable cutting conditions.

Product	Grade	RE (mm)	P	M	K	N	S	H	ap min (mm)	ap max (mm)	fz min (mm/tooth)	fn max (mm/rev)
LNGF 361220-PM	6630	–	■	◩					0.60	2.00	1.15	12.00
LNGF 361220-PM-S01	T7325	–	◩	◩					0.60	2.00	1.15	12.00
	T9315	–	■						0.60	2.00	1.15	12.00
LNGF 361220-PM-S02	T7325	–	◩	◩					0.60	2.00	1.15	12.00
LNGF 361220-PM-S03	T7325	–	◩	◩					0.60	2.00	1.15	12.00

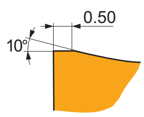
LNGF 40

	L (mm)	S (mm)	APMX (mm)	KRINS (°)	W1 (mm)	BS (mm)
4010	40.00	10.15	3.50	25.0	20.000	20.00

PRAMET



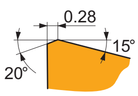
Product	Grade	RE (mm)	P	M	K	N	S	H	ap min (mm)	ap max (mm)	fz min (mm/tooth)	fn max (mm/rev)



W U HFC S

Peeling geometry MM for medium depth of cut, high linear speed, wiper secondary cutting edge for stable to unstable conditions.

Product	Grade	RE (mm)	P	M	K	N	S	H	ap min (mm)	ap max (mm)	fz min (mm/tooth)	fn max (mm/rev)
LNGF 401035-MM-S01	T6310	–	■	■			◩		0.70	3.50	1.20	16.00
	T7325	–	◩	■			◩		0.70	3.50	1.20	16.00
	T9315	–	■						0.70	3.50	1.20	16.00
LNGF 401035-MM-S02	T7325	–	◩	■			◩		0.70	3.50	1.20	16.00
LNGF 401035-MM-S03	T7325	–	◩	■			◩		0.70	3.50	1.20	16.00



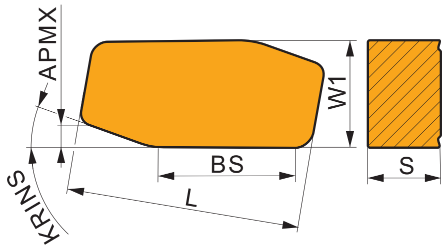
W HFC S

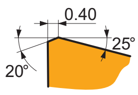
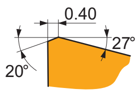
Peeling geometry PM for medium depth of cut, high linear speed, wiper secondary cutting edge for stable to unstable cutting conditions.

Product	Grade	RE (mm)	P	M	K	N	S	H	ap min (mm)	ap max (mm)	fz min (mm/tooth)	fn max (mm/rev)
LNGF 401035-PM-S01	6630	–	■	◩					0.70	3.50	1.20	16.00
	T7325	–	◩	◩					0.70	3.50	1.20	16.00
	T9226	–	■	◩					0.70	3.50	1.20	16.00
	T9315	–	■						0.70	3.50	1.20	16.00
LNGF 401035-PM-S02	T7325	–	◩	◩					0.70	3.50	1.20	16.00
LNGF 401035-PM-S03	T7325	–	◩	◩					0.70	3.50	1.20	16.00

LNXR

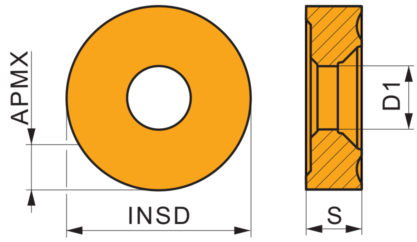
	L (mm)	S (mm)	APMX (mm)	KRINS (°)	W1 (mm)	BS (mm)
3812	38.25	12.00	4.00	20.0	17.500	21.00

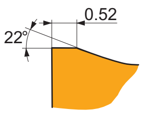


Product		RE (mm)	P	M	K	N	S	H	ap min (mm)	ap max (mm)	fz min (mm/tooth)	fn max (mm/rev)
 			Peeling geometry PM with wiper secondary cutting edge for medium depth of cut, high linear speed and unstable cutting conditions.									
LNXR 381240-PM	T9315	–	■						0.70	4.00	1.20	16.00
 			Peeling geometry PR with wiper secondary cutting edge for medium depth of cut, high linear speed and unstable cutting conditions.									
LNXR 381240-PR	6630	–	■						0.70	4.00	1.20	16.00

RNGH

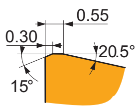
	INSD (mm)	S (mm)	APMX (mm)	D1 (mm)
3812	38.100	12.70	12.00	12.70
5018	50.000	18.00	16.00	12.70



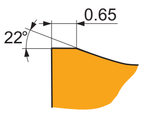
Peeling geometry MM for large depth of cut and very unstable cutting conditions.

Product	Grade	RE (mm)	P	M	K	N	S	H	ap min (mm)	ap max (mm)	fz min (mm/tooth)	fn max (mm/rev)
RNGH 381200-MM	T6310	–	■	■			◩		3.00	12.00	1.00	8.00
	T7325	–	◩	■			◩		3.00	12.00	1.00	8.00
	T9315	–	■						3.00	12.00	1.00	8.00

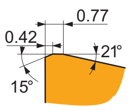
Peeling geometry MR for large depth of cut and very unstable cutting conditions.

Product	Grade	RE (mm)	P	M	K	N	S	H	ap min (mm)	ap max (mm)	fz min (mm/tooth)	fn max (mm/rev)
RNGH 381200-MR	6640	–	■	■					3.00	12.00	1.25	10.00
	T7325	–	◩	■			◩		3.00	12.00	1.25	10.00
	T9226	–	■	■			◩		3.00	12.00	1.25	10.00
	T9315	–	■						3.00	12.00	1.25	10.00

Peeling geometry MM for very large depth of cut and very unstable cutting conditions.

Product	Grade	RE (mm)	P	M	K	N	S	H	ap min (mm)	ap max (mm)	fz min (mm/tooth)	fn max (mm/rev)
RNGH 5018MO-MM	M9340	–	■	■			◩		4.50	16.00	1.50	12.00
	T6310	–	■	■			◩		4.50	16.00	1.50	12.00
	T7325	–	◩	■			◩		4.50	16.00	1.50	12.00
	T9315	–	■						4.50	16.00	1.50	12.00

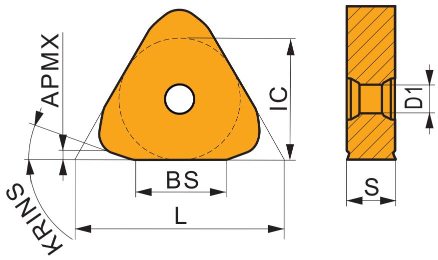
Peeling geometry MR for very large depth of cut and extremely unstable cutting conditions.

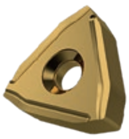
Product	Grade	RE (mm)	P	M	K	N	S	H	ap min (mm)	ap max (mm)	fz min (mm/tooth)	fn max (mm/rev)
RNGH 5018MO-MR	M9340	–	■	■			◩		4.50	16.00	1.50	12.00
	T7325	–	◩	■			◩		4.50	16.00	1.50	12.00
	T9335	–	■	■			◩		4.50	16.00	1.50	12.00

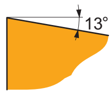
TNGJ

PRAMET

	L (mm)	S (mm)	APMX (mm)	KRINS (°)	IC (mm)	D1 (mm)	BS (mm)
2207	38.00	7.94	2.00	20.0	21.96	7.00	12.00
2810	49.50	10.00	2.50	20.0	28.60	7.00	18.00

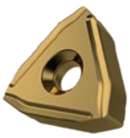


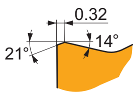




Peeling geometry PF with wiper secondary cutting edge for small depth of cut, high linear speed for stable to less stable cutting conditions.

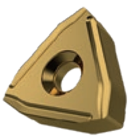
Product	Grade	RE (mm)	P	M	K	N	S	H	ap min (mm)	ap max (mm)	fz min (mm/tooth)	fn max (mm/rev)
TNGJ 220720-PF-S01	T9315	–	■						0.50	2.00	0.90	9.00
TNGJ 220720-PF-S02	T7325	–	◩	◩			◩		0.50	2.00	0.90	9.00

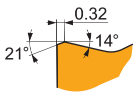




Peeling geometry PM with wiper secondary cutting edge for small depth of cut, high linear speed for stable to less stable cutting conditions.

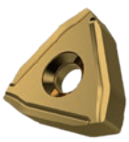
Product	Grade	RE (mm)	P	M	K	N	S	H	ap min (mm)	ap max (mm)	fz min (mm/tooth)	fn max (mm/rev)
TNGJ 220720-PM-S01	T9315	–	■						0.50	2.00	0.90	9.00

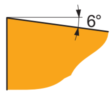




Peeling geometry PM with wiper secondary cutting edge for small depth of cut, high linear speed for stable to less stable cutting conditions.

Product	Grade	RE (mm)	P	M	K	N	S	H	ap min (mm)	ap max (mm)	fz min (mm/tooth)	fn max (mm/rev)
TNGJ 220720-PM-S02	T7325	–	◩	◩					0.50	2.00	0.90	9.00
	T9226	–	■	◩					0.50	2.00	0.90	9.00
	T9315	–	■						0.50	2.00	0.90	9.00





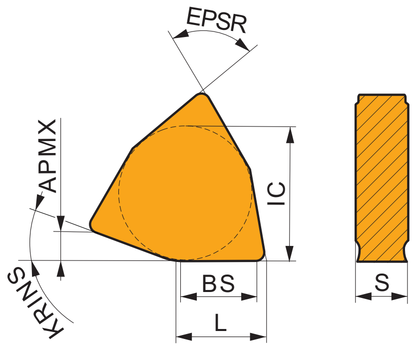
Peeling geometry PF with wiper secondary cutting edge for medium depth of cut, high linear speed for stable to less stable conditions.

Product	Grade	RE (mm)	P	M	K	N	S	H	ap min (mm)	ap max (mm)	fz min (mm/tooth)	fn max (mm/rev)
TNGJ 281025-PF-S01	6630	–	■	◩			◩		0.60	2.50	1.00	14.00
	T9226	–	■	◩			◩		0.60	2.50	1.00	14.00
	T9315	–	■						0.60	2.50	1.00	14.00

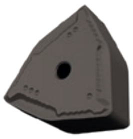
WNGF

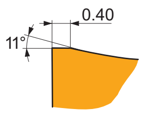
PRAMET

	L (mm)	S (mm)	APMX (mm)	KRINS (°)	IC (mm)	EPSR (°)	BS (mm)
2013	20.00	13.00	8.00	25.0	31.750	85.0	15.00



Product		RE (mm)	P	M	K	N	S	H	ap min (mm)	ap max (mm)	fz min (mm/tooth)	fn max (mm/rev)
WNGF 201380-MM-S01	T6310	–	■	■			◩		1.00	8.00	1.20	12.00
	T7325	–	◩	■			◩		1.00	8.00	1.20	12.00
	T9315	–	■						1.00	8.00	1.20	12.00
WNGF 201380-MM-S02	T7325	–	◩	■			◩		1.00	8.00	1.20	12.00
WNGF 201380-MM-S03	M9340	–	◩	■			◩		1.00	8.00	1.20	12.00



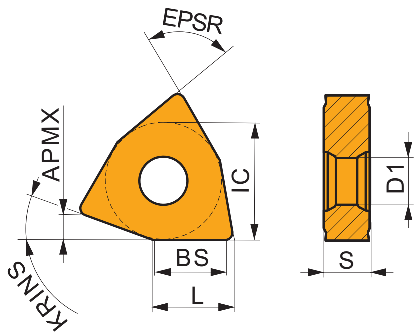


Peeling geometry MM with wiper secondary cutting edge for large depth of cut, high linear speed and unstable cutting conditions.

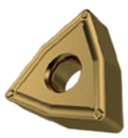
WNGU

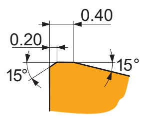
PRAMET

	L (mm)	S (mm)	APMX (mm)	KRINS (°)	IC (mm)	EPSR (mm)	D1 (mm)
1509	15.00	9.52	3.50	15.0	22.225	75.0	7.94



Product		RE (mm)	P	M	K	N	S	H	ap min (mm)	ap max (mm)	fz min (mm/tooth)	fn max (mm/rev)
WNGU 150935-PM-S02	6630	–	■	◩					0.80	3.50	1.15	9.00
	T9226	–	■	◩					0.80	3.50	1.15	9.00



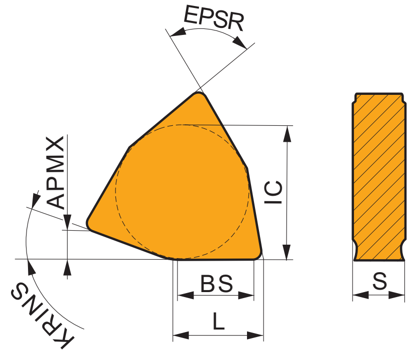


Peeling geometry PM with wiper secondary cutting edge for small depth of cut, high linear speed for stable to less stable cutting conditions.

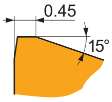
WNMF

PRAMET

	L (mm)	S (mm)	APMX (mm)	KRINS (°)	IC (mm)	EPSR (mm)	BS (mm)
2013	20.00	13.00	8.00	25.0	31.750	85.0	15.00



Product		RE (mm)	P	M	K	N	S	H	ap min (mm)	ap max (mm)	fz min (mm/tooth)	fn max (mm/rev)
WNMF 201380-PM-S01	6630	–	■	◩					1.00	8.00	1.20	12.00
	T9226	–	■	◩					1.00	8.00	1.20	12.00

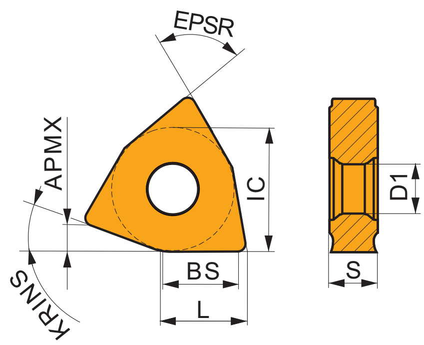


Peeling geometry PM for large depth of cut, high linear speed, wiper secondary cutting edge for stable to less stable cutting conditions.

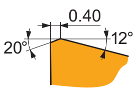
WNMJ

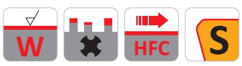
PRAMET

	L (mm)	S (mm)	APMX (mm)	KRINS (°)	IC (mm)	EPSR (mm)	D1 (mm)
2013	20.00	13.00	8.00	25.0	31.750	85.0	9.00
2014	20.00	14.00	8.00	25.0	31.750	85.0	9.00



Product		RE (mm)	P	M	K	N	S	H	ap min (mm)	ap max (mm)	fz min (mm/tooth)	fn max (mm/rev)
WNMJ 201380-PR	T9226	–	■						1.00	8.00	1.20	12.00
WNMJ 201480-PR	6630	–	■						1.00	8.00	1.20	12.00
	T9226	–	■						1.00	8.00	1.20	12.00



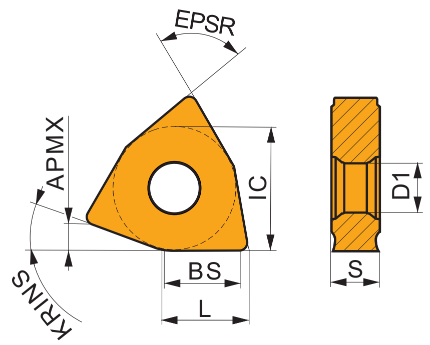


Peeling geometry PR for large depth of cut, high linear speed, wiper secondary cutting edge for unstable cutting conditions.

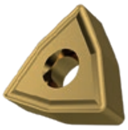
WNXJ

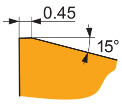
PRAMET

	L (mm)	S (mm)	APMX (mm)	KRINS (°)	IC (mm)	EPSR (mm)	D1 (mm)
1509	15.00	9.52	3.50	15.0	22.225	75.0	7.94
2013	20.00	13.00	8.00	25.0	31.750	85.0	9.00

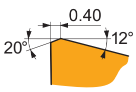


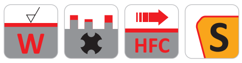
Product	Grade	RE (mm)	P	M	K	N	S	H	ap min (mm)	ap max (mm)	fz min (mm/tooth)	fn max (mm/rev)
WNXJ 150935-PM	6630	–	■	◩					0.80	3.50	1.15	9.00
WNXJ 201380-PR-S01	6630	–	■						1.00	8.00	1.20	12.00





Peeling geometry PM for medium depth of cut, high linear speed, wiper secondary cutting edge for stable to less stable cutting conditions.



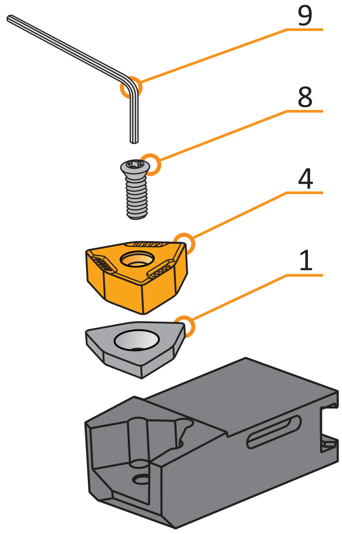


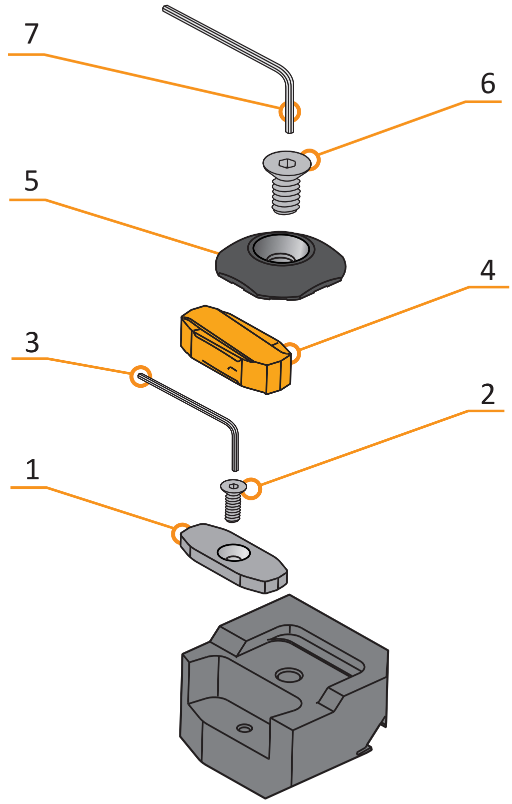
Peeling geometry PR for large depth of cut, high linear speed, wiper secondary cutting edge for unstable cutting conditions.

ACCESSORIES AND SPECIAL PRODUCTS

Bar Peeling inserts are generally mounted in two ways, either using a screw through the centre hole of the indexable insert or via a top clamp mechanism.

Most of our cassettes are equipped with a cemented carbide shim (washer) to protect the pocket and extend the life of the cassettes. The spare parts list for individual fastening systems is shown in the diagrams below and in the table of individual components.





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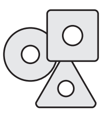
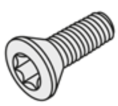
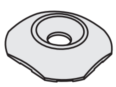
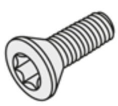
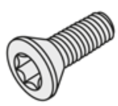
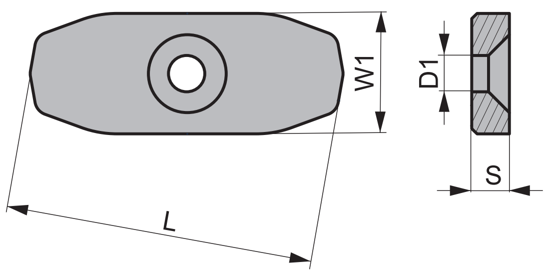
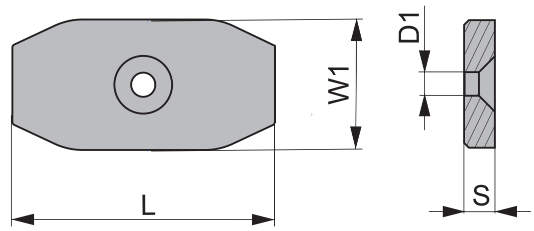
								
LNGF 3007..	LNW 300310	HCS 0308	HXK 2	UP 3005	HCS 0612	HXK 4	-	-
LNGF 3612..	LNW 360310	HCS 0308	HXK 2	UP 3005	HCS 0612	HXK 4	-	-
LNGF 4010..	LNW 400410	HCS 0310	HXK 2	UP 3005	HCS 0612	HXK 4	-	-
RNGH 3812..	RNX 380700	-	-	-	-	-	HCS 1030	HXK 6
WN.J 2013..	WNW 200615	-	-	-	-	-	US 8025-T30P	SDR T30P
WN.F 2013..	WNW 200615	HCS 0816	HXK 5	UP 4107	HCS 0820	HXK 5		-

LNW 300310
LNW 360310



LNW 400410



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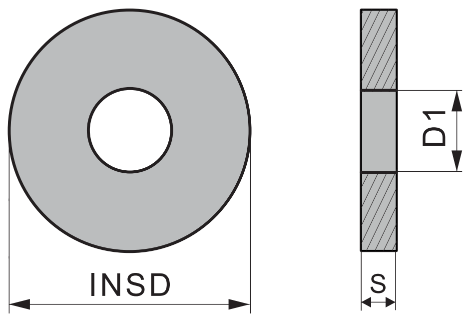

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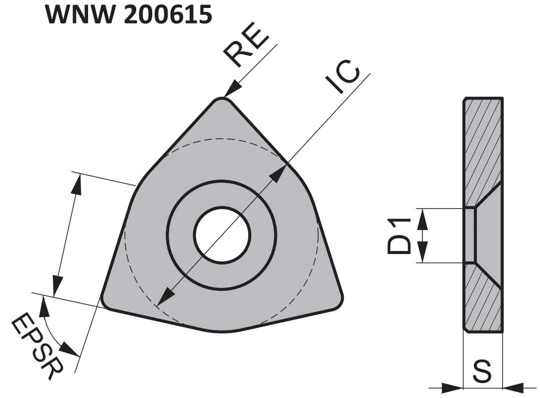
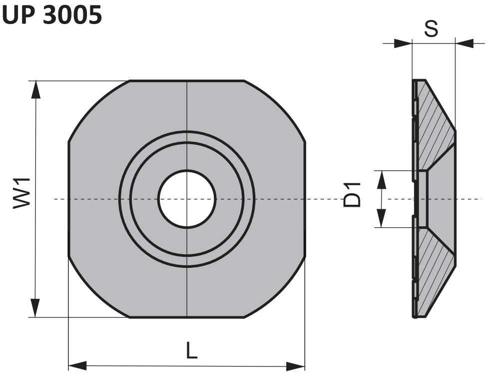
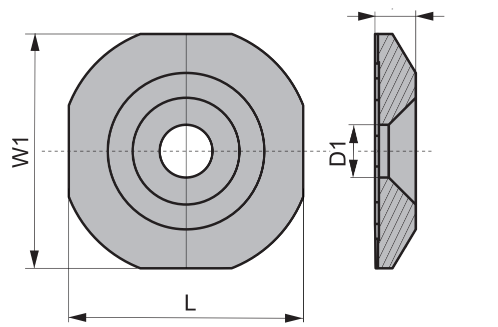


UP 3005



UP 4107



	L	W1	S	D1	IC / INSD	EPSR
LNW 300310	29.75	11.60	3.50	3.50	-	-
LNW 360310	36.10	17.60	3.50	3.50	-	-
LNW 400410	39.70	19.70	4.75	3.50	-	-
WNW 200615	20.00	-	6.00	9.00	31.40	85
RNX 380700	-	-	7.00	11.15	37.75	-
UP 3005	27.00	27.00	4.70	6.50	-	-
UP 4107	38.20	38.20	6.40	8.60	-	-

Accurate holding cassettes have a significant impact on the machining process. There are many manufacturers of machine tools for bar peeling around the world. Most of these use different holders in their cutting heads which are equipped with proprietary cassettes for the inserts. Dormer Pramet can make custom-made cassettes using the highest quality tool steels that will match the specifics of your machine tool. Pockets on these holders are designed to utilize our standard inserts. Production of special indexable tooling to meet the specific needs of our customers is also possible.

TECHNICAL INFORMATION

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ISO group		Subgroup		WMG (Work Material Group)		k_{vG}	Examples of material (AISI, EN, DIN, ČSN, GB, SS, STN, BS, UNE, AFNOR, ASTM, GOST, UNS, UNI, ...)
P	**Steel and cast steel** (steels with alloy content ≤ 10 % and a hardness of < 45HRC)	P1	Free machining steel (carbon steels with increased machinability)	P1.1	Free machining sulfurized carbon steel with a hardness of < 240 HB	1.33	AISI **1108,** EN **15S22,** DIN **1.0723,** SS **1922,** ČSN **11120,** BS **210A15,** UNE **F.210F,** GB **Y15,** AFNOR **10F1,** GOST **A30,** UNI **CF10S20**
				P1.2	Free machining sulfurized and phosphorized carbon steel with a hardness of < 180 HB	1.49	AISI **1211,** EN **11SMn30,** DIN **1.0715,** SS **1912,** ČSN **11109,** BS **230M7,** UNE **F.2111,** GB **Y15,** AFNOR **S250,** GOST **A40G,** UNI **CF9SMn28**
				P1.3	Free machining sulfurized/phosphorized and leaded carbon steel with a hardness of < 180 HB	1.53	AISI **12L13,** EN **11SMnPb30,** DIN **1.0718,** SS **1914,** ČSN **12110,** BS **210M16,** UNE **F.2114,** GB **Y15Pb,** AFNOR **S250Pb,** GOST **AS35G2,** UNI **CF10SPb20**
		P2	Plain carbon steel (steels comprised of mainly iron and carbon)	P2.1	Plain low carbon steel containing < 0.25 % C with a hardness of < 180 HB	1.14	AISI **1015,** EN **C15,** DIN **1.0401,** SS **1350,** ČSN **11301 ,** BS **080A15,** UNE **F.111,** GB **15,** AFNOR **C18RR,** GOST **St2ps,** UNI **Fe360**
				P2.2	Plain medium carbon steel containing < 0.55 %C with a hardness of < 240 HB	1.00	AISI **1030,** EN **C30,** DIN **1.0528,** SS **1550,** ČSN **12031,** BS **080M32,** UNE **F.1130,** GB **30,** AFNOR **AF50C30,** GOST **30G,** UNI **Fe590**
				P2.3	Plain high carbon steel containing > 0.55 % C, with a hardness of < 300 HB	0.89	AISI **1060,** EN **C60,** DIN **1.0601,** SS **1655,** ČSN **12061,** BS **080A62,** UNE **F513,** GB **60,** AFNOR **1C60,** GOST **60G,** UNI **C60**
		P3	Alloy steel (carbon steels with an alloying content ≤ 10 %)	P3.1	Alloy steel with a hardness of < 180 HB	0.92	AISI **5015,** EN **16Mo3,** DIN **1.5415,** SS **2912,** ČSN **15020,** BS **1501-240,** UNE **F.2601,** GB **16Mo,** AFNOR **15D3,** GOST **15M,** UNI **16Mo3KW**
				P3.2	Alloy steel with a hardness of 180 – 260 HB	0.74	AISI **4140,** EN **42CrMo4,** DIN **1.7225,** SS **2244,** ČSN **15142,** BS **708M40,** UNE **F.8232,** GB **42CrMo,** AFNOR **42CD4,** GOST **40ChFA,** UNI **42CrMo4**
				P3.3	Alloy steel with a hardness of 260 – 360 HB	0.63	AISI **4140,** EN **42CrMo4,** DIN **1.7225,** SS **2244,** ČSN **15142,** BS **708M40,** UNE **F.8232,** GB **42CrMo,** AFNOR **42CD4,** GOST **40ChFA,** UNI **42CrMo4**
		P4	Tool steel (special alloy steel for tools, dies and molds)	P4.1	Tool steel with a hardness of < 26 HRC	0.55	AISI **D2,** EN **X155CrVMo12-1,** DIN **1.2370,** SS **2736,** ČSN **19573,** BS **BD2,** UNE **F.520A,** GB **Cr12Mo1V1,** AFNOR **Z160CDV12,** GOST **Ch12MF,** UNI **X155CrVMo121KU**
				P4.2	Tool steel with a hardness of 26 – 39 HRC	0.47	AISI **D2,** EN **X155CrVMo12-1,** DIN **1.2370,** SS **2736,** ČSN **19573,** BS **BD2,** UNE **F.520A,** GB **Cr12Mo1V1,** AFNOR **Z160CDV12,** GOST **Ch12MF,** UNI **X155CrVMo121KU**
				P4.3	Tool steel with a hardness of 39 – 45 HRC	0.38	AISI **D2,** EN **X155CrVMo12-1,** DIN **1.2370,** SS **2736,** ČSN **19573,** BS **BD2,** UNE **F.520A,** GB **Cr12Mo1V1,** AFNOR **Z160CDV12,** GOST **Ch12MF,** UNI **X155CrVMo121KU**

ISO group		Subgroup		WMG (Work Material Group)		k_{vG}	Examples of material (AISI, EN, DIN, ČSN, GB, SS, STN, BS, UNE, AFNOR, ASTM, GOST, UNS, UNI, ...)
M	**Stainless steel** (corrosion resistant steels with ≥ 11 % chromium content)	M1	Ferritic stainless steel (straight chromium non-hardenable alloys)	M1.1	Stainless steel, ferritic with a hardness of < 160 HB	1.22	AISI **S429,** EN **X7Cr14,** DIN **1.4001,** SS **2326,** BS **434S17,** UNE **F.3401,** AFNOR **Z8C12,** GOST **08Ch13,** UNI **X6CrTi12**
				M1.2	Stainless steel, ferritic with a hardness of 160 – 220 HB	1.03	AISI **446,** EN **X10CrAl24,** DIN **1.4762,** SS **2322,** ČSN **17113,** BS **430S17,** UNE **F.3154,** GB **10Cr17,** AFNOR **Z10CAS24,** GOST **12Ch17,** UNI **X16Cr26**
		M2	Martensitic stainless steel (straight chromium hardenable alloys)	M2.1	Stainless steel, martensitic with a hardness of < 200 HB	1.08	AISI **430F,** EN **X14CrMoS17,** DIN **1.4104,** SS **2383,** ČSN **17140,** BS **410S21,** UNE **F.3117,** AFNOR **Z10CF17,** UNI **X10CrS17**
				M2.2	Stainless steel, martensitic with a hardness of 200 – 280 HB	0.89	AISI **440C,** EN **X105CrMo17,** DIN **1.4125,** SS **2385,** ČSN **17023,** BS **425C11,** UNE **F.3402,** GB **102Cr17Mo,** AFNOR **Z100CD17,** GOST **95Ch18,** UNI **GX6CrNi 13 04**
				M2.3	Stainless steel, martensitic with a hardness of 280 – 380 HB	0.75	AISI **420,** EN **X45Cr13,** DIN **1.4034,** ČSN **17029,** BS **425C11,** UNE **F.3405,** AFNOR **Z44C14,** GOST **20X17H12,** UNI **X30Cr13**
		M3	Austenitic stainless steel (chromium-nickel and chromium-nickel-manganese alloys)	M3.1	Stainless steel, austenitic with a hardness of < 200 HB	1.00	AISI **304,** EN **X5CrNi18-12,** DIN **1.4303,** SS **2352,** ČSN **17249,** BS **305S17,** UNE **F.3513,** GB **10Cr18Ni12,** AFNOR **Z8CN18.12,** UNI **X7CrNi18 10**
				M3.2	Stainless steel, austenitic with a hardness of 200 – 260 HB	0.86	AISI **309,** EN **X15CrNiSi20-12,** DIN **1.4828,** ČSN **17251,** BS **309S24,** UNE **F.3312,** GB **1Cr23Ni13,** AFNOR **Z15CNS20.12,** GOST **20Ch20N14S2,** UNI **16CrNi23 14**
				M3.3	Stainless steel, austenitic with a hardness of 260 – 300 HB	0.77	AISI **5848,** EN **X45CrNiW18-9,** DIN **1.4873,** BS **331S40,** UNE **F.3211,** AFNOR **Z35CNWS14-4,** UNI **X45CrNiW 18 9**
		M4	Super-austenitic, Duplex or Precipitation Hardening stainless steel (austenitic alloys with > 20 % Ni, austenitic-ferritic microstructure or precipitation hardened)	M4.1	Stainless steel, austenitic-ferritic or super-austenitic with a hardness of < 300 HB	0.75	AISI **329,** EN **X1-NiCrMoCU25-20-5,** DIN **1.4539,** SS **2562,** ČSN **17265,** BS **318S13,** UNE **F.3552,** GB **022Cr25NiMo2N,** AFNOR **Z1NCDU25.20**
				M4.2	Stainless steel, precipitation hardening austenitic with a hardness of 300 – 380 HB	0.64	AISI **631 (17-7PH),** EN **X7CrNiAL17-7,** DIN **1.4568,** SS **2388,** ČSN **17465 ,** BS **301S13,** UNE **F.3217,** GB **07Cr17Ni7Al,** AFNOR **29CNA17-07,** GOST **09Ch17N7Ju1,** UNI **X53CrMnNiN21 9**

ISO group		Subgroup		WMG (Work Material Group)		k_{vG}	Examples of material (AISI, EN, DIN, ČSN, GB, SS, STN, BS, UNE, AFNOR, ASTM, GOST, UNS, UNI, ...)
S	**High-temperature alloys** (superalloys with high temperature stength and corrosion resistant surpassing that of stainless steel)	S1	Titanium or titanium alloys	S1.1	Titanium or titanium alloys, with a hardness of <200 HB	1.94	UNS **R50250 (Grade 1),** EN **Ti 99.6,** DIN **3.7035,** BS **TA.2,** UNE **Ti-Po2,** AFNOR **T-40,** GOST **BT1-00,** AISI **R50250, 3.7025, T35, 2TA1, R50400, 3.7035, 2TA2,**
				S1.2	Titanium alloys, with a hardness of 200 – 280 HB	1.72	UNS **R56404 (Grade 29),** EN **Ti2Cu,** DIN **3.7124,** BS **TA.21,** UNE **Ti-P11,** AFNOR **T-U2 ,** AISI **TA6V, Ti-6Al-4V, Ti 10.2.3, Ti5553**
				S1.3	Titanium alloys, a hardness of 280 – 360 HB	1.44	UNS **R54250 (Grade 38),** EN **TiAl6V4,** DIN **3.7165,** ČSN **TiAl6VELI,** BS **TA. 13,** UNE **Ti-P63,** AFNOR **T-A6V,** GOST **BT6,** AISI **TA6V, Ti-6Al-4V, Ti 10.2.3, Ti5553**
		S2	Fe-based high-temperature alloys	S2.1	High-temperature Fe-based alloys with a hardness of <200 HB	1.33	UNS **N08801 (Incoloy 801),** EN **X8 NiCrAlTi31-21,** DIN **1.4959,** BS **NA 15,** AFNOR **Z8NC33-21,** AISI **A-286, Discaloy, Haynes 556, Iconel 909, Greek Ascolloy**
				S2.2	High-temperature Fe-based alloys with a hardness of 200 – 280 HB	1.17	UNS **N19907,** EN **X6NiCrTiMoVB25-15-2,** DIN **1.4980,** SS **2570,** BS **HR52,** AFNOR **Z6NCTDV25.15B,** GOST **36НХТЮ,** AISI **A-286, Discaloy, Haynes 556, Iconel 909, Greek Ascolloy**
		S3	Ni-based high-temperature alloys	S3.1	High-temperature Ni-based alloys with a hardness of <280 HB	1.00	UNS **A09706 (Inconel 706),** EN **NiCr25FeAl,** DIN **2.4856,** BS **HR 6,** ČSN **Inconel 625,** UNE **F.3313,** GB **1Cr16Ni35,** AFNOR **NC22FeDNB,** GOST **XH38BT,** AISI **Inconel 718, 706 Waspalloy, Udimet 720, Inconel 625**
				S3.2	High-temperature Ni-based alloys with a hardness of 280 – 360 HB	0.83	UNS **N07001,** EN **NiCr20Co13Mo4Ti3Al,** DIN **2.4654,** BS **HR 2,** ČSN **Waspaloy,** AFNOR **NCKD 20ATV,** GOST **XH80TБЮ,** AISI **Inconel 718, 706 Waspalloy, Udimet 720, Inconel 625**
		S4	Co-based high-temperature alloys	S4.1	High-temperature Co-based alloys with a hardness of <240 HB	0.78	UNS **R30016 (Stellite 6b),** EN **CoCr20W15Ni,** DIN **2.4964,** AFNOR **KC 20 WN,** GOST **ЛK52,** AISI **Haynes 25, Stellite 21, 31**
				S4.2	High-temperature Co-based alloys with a hardness of 240 – 320 HB	0.67	UNS **R30016 (Stellite 6b),** EN **CoCr20W15Ni,** DIN **2.4964,** AFNOR **KC 20 WN,** GOST **ЛK52,** AISI **Haynes 25, Stellite 21, 31**

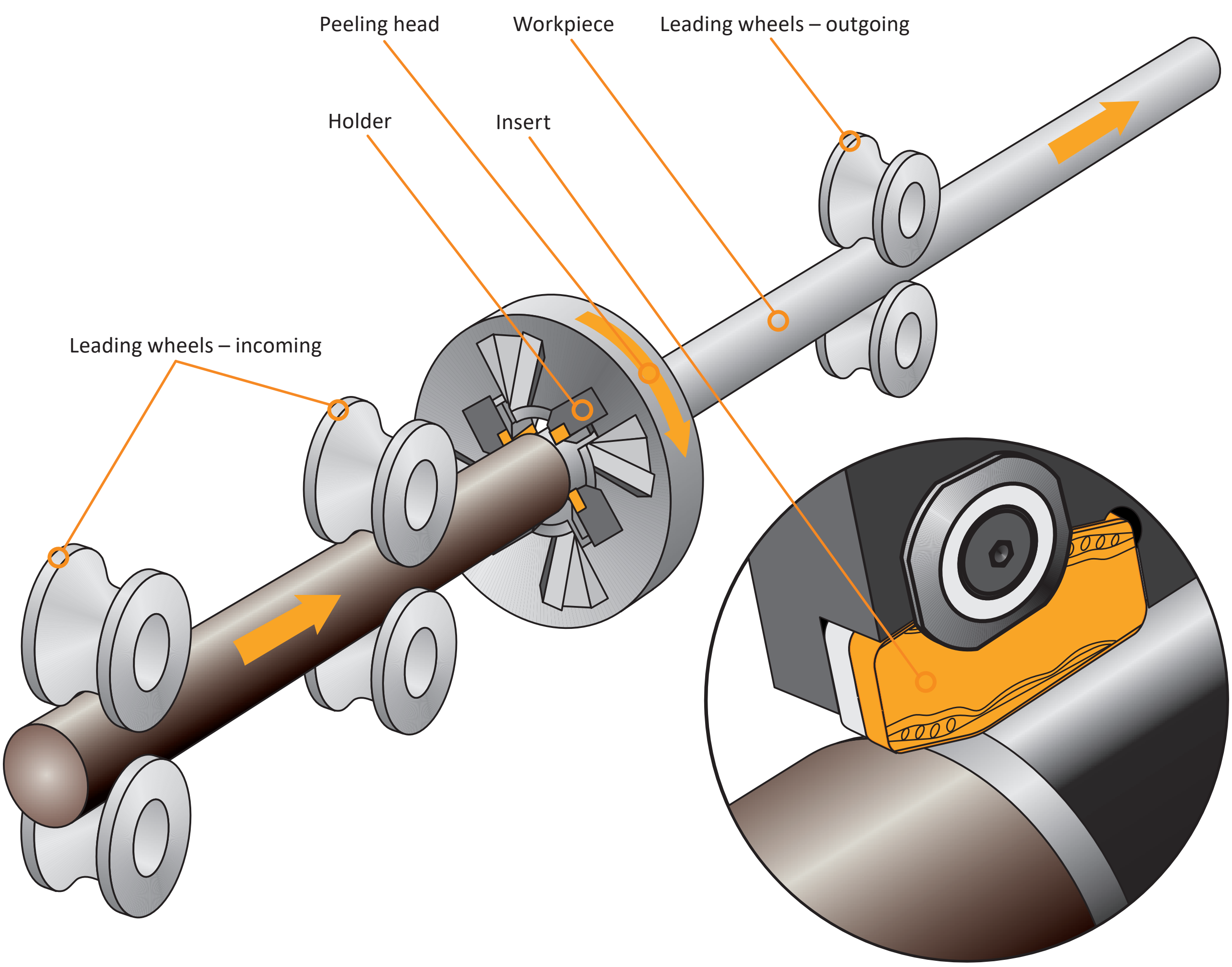
BAR PEELING

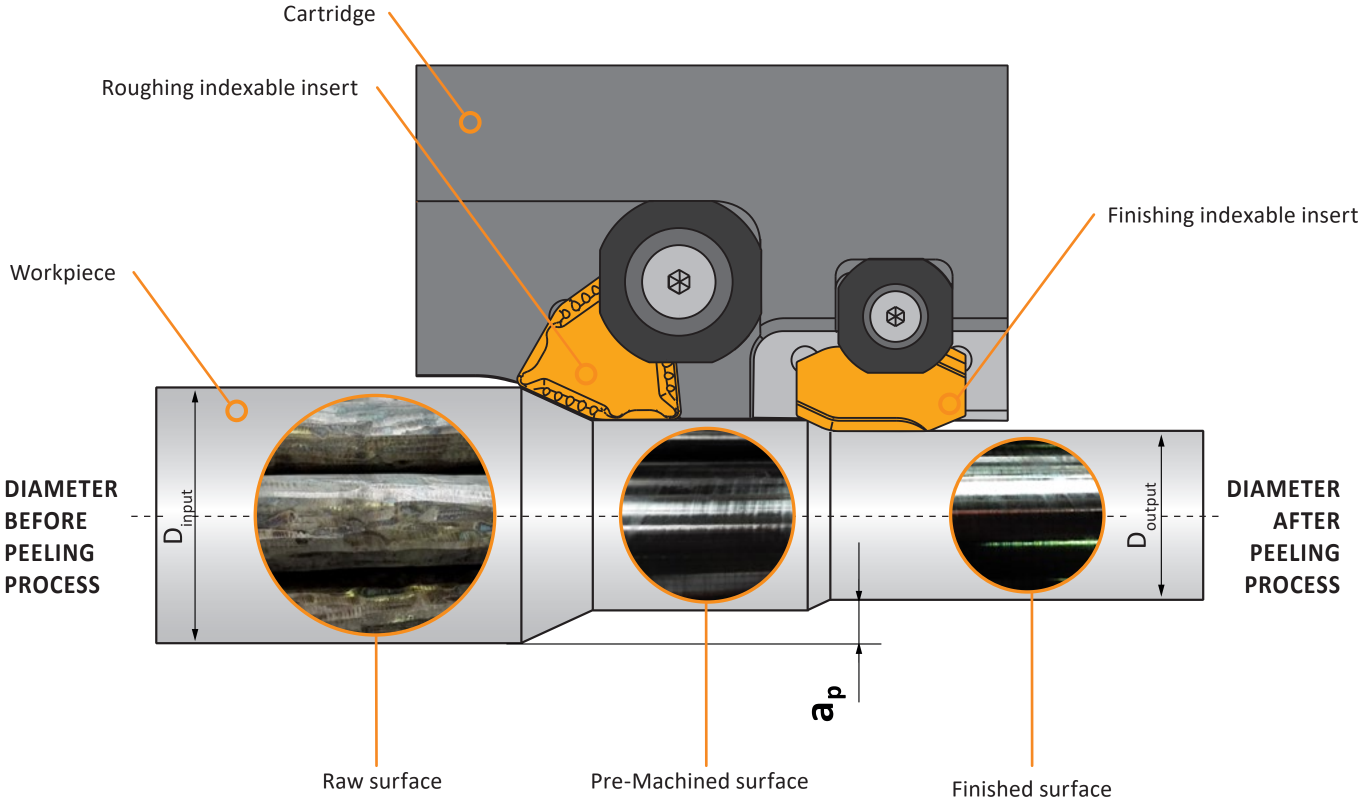
The outstanding feature of this specific operation is relatively high feed rates and small depth of cut applied to round bars and thick walled tubes. Peeling operations remove surface layers of oxides, rolled contaminants and cracks caused by hot forging or rolling.

Peeled materials are mostly carbon steel, alloy steel for heat treating, tool steel, stainless steel and also heat–resistant alloys based on Ni, Co, Fe and Ti.

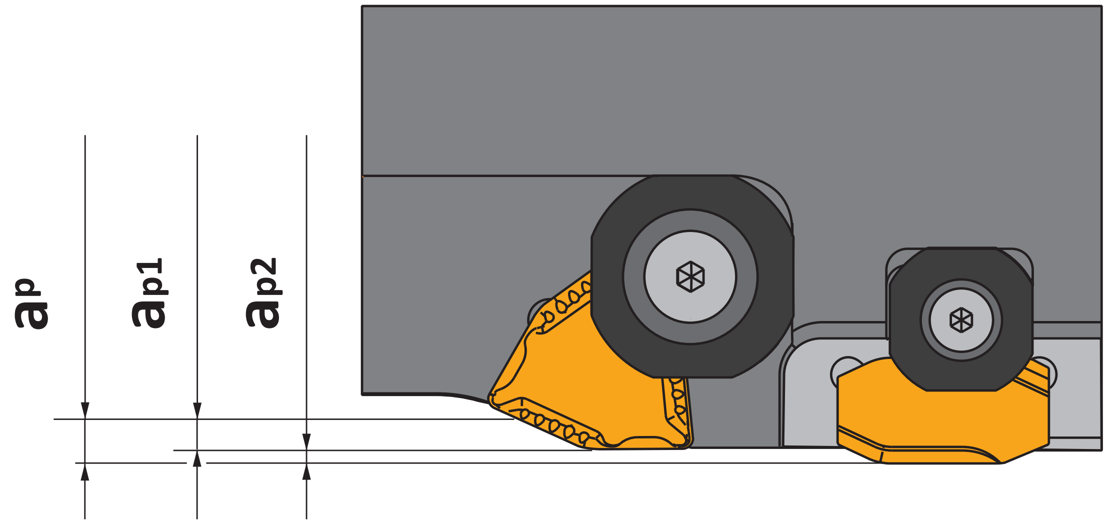
The advantages of peeling technology in comparison with turning are:

- Machining at higher feed rates
- Higher productivity
- Less inserts consumption
- Excellent roughness quality
- High dimensional accuracy



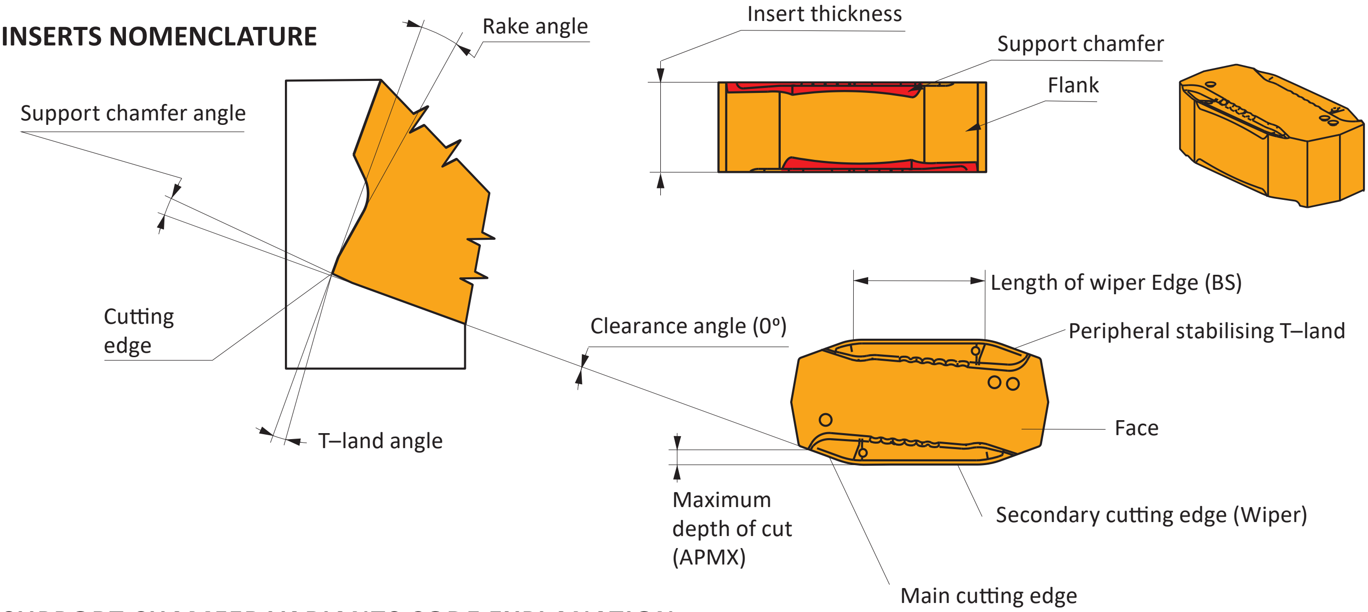


The total depth of cut $\mathbf{a_p}$ is the difference between the input diameter and output diameter of the workpiece divided by two.

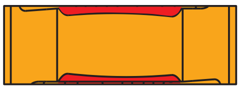
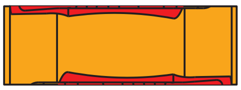
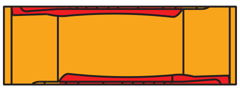


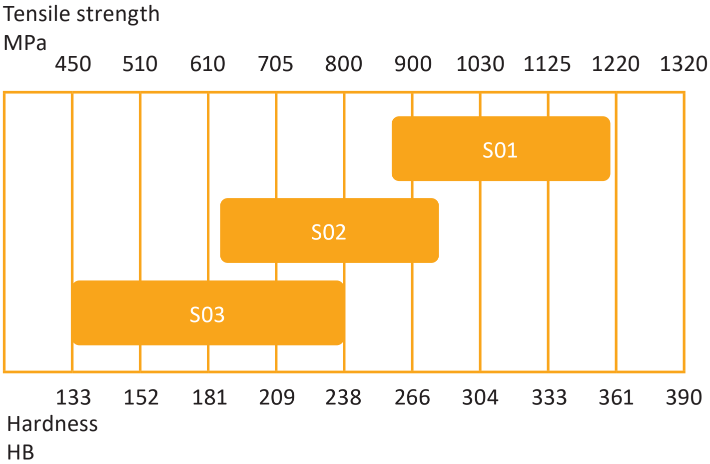
Depth of cut ap in cassettes with more than one insert is divided into the partial depths of cut for each insert ($\mathbf{a_{p1}}$; $\mathbf{a_{p2}}$). Those values should be taken into consideration during detailed analyses of the cutting conditions of the roughing and finishing inserts.

INSERTS NOMENCLATURE



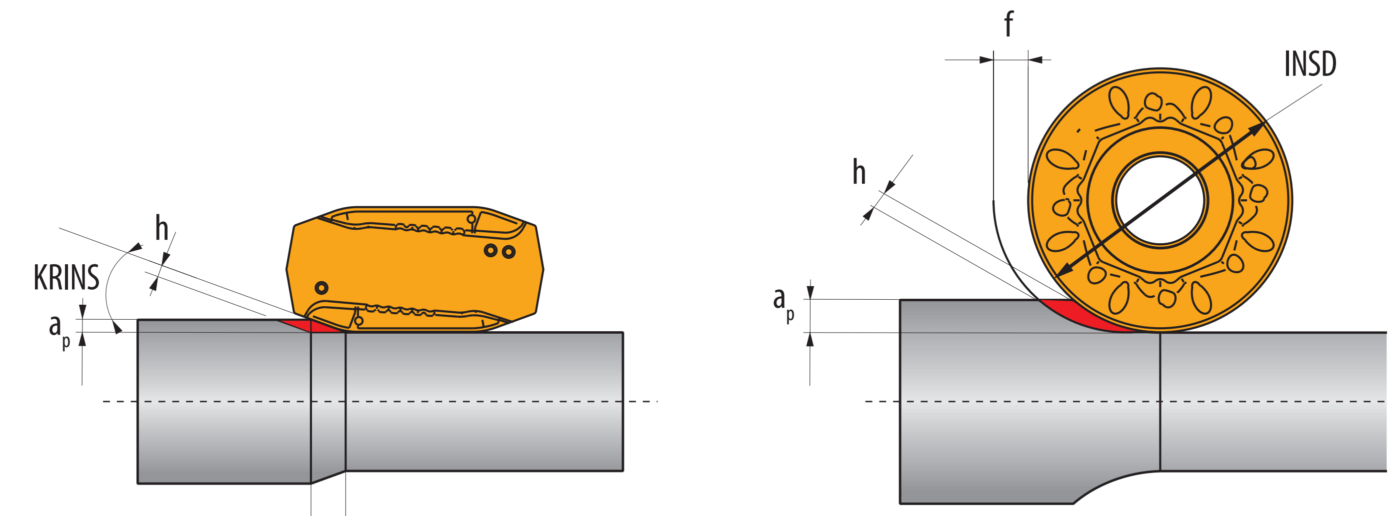
SUPPORT CHAMFER VARIANTS CODE EXPLANATION

Support chamfer variant	Sketch	Main cutting edge – angle	Wiper cutting edge – angle	Workpiece material properties
S01		0°	5°	850 — 1200 MPa 123 — 174 kPsi 250 — 360 HB Tempered
S02		3°	5°	600 — 950 MPa 87 — 137 kPsi 180 — 260 HB Basic hardness
S03		5°	5°	450 — 800 MPa 65 — 116 kPsi 150 — 230 HB Annealed



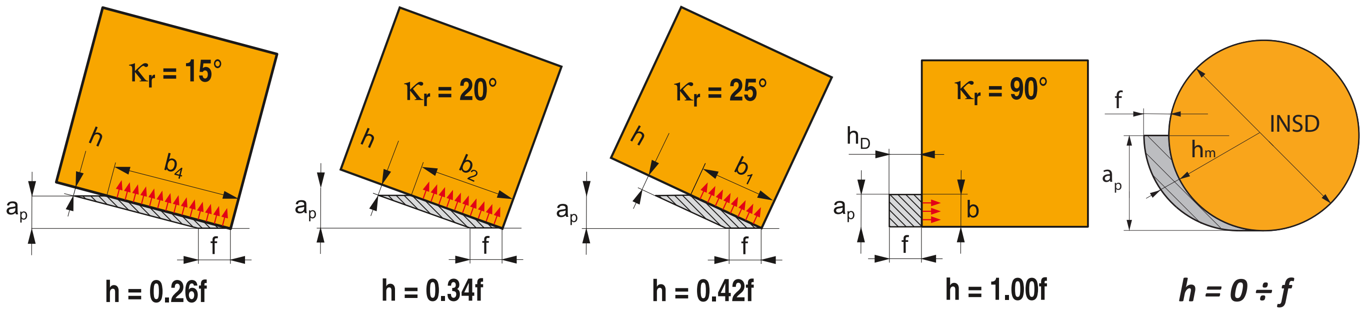
The setting angle of the main cutting edge KRINS, has the most influence on the cutting forces and cross-section shape of the chip. Reducing angle KRINS makes the chip thinner at a given feed ***f*** and depth of cut a_p. Whereas if KRINS = 90° the chip thickness ***h = f*** and the chip width $b = a_p$ becomes wider. Regarding the decreasing setting angle, the function width of the T-land is increasing and the rake angle of insert is decreasing. For round inserts, the chip thickness **h** varies from **0** to ***f*** depending on the depth of cut a_p. For that reason we use the average chip thickness value **hm** which is based on the relation a_p/INSD, where **INSD** is the external diameter of the round insert.

Dependence of chip thickness **h** on setting angle **KRINS**

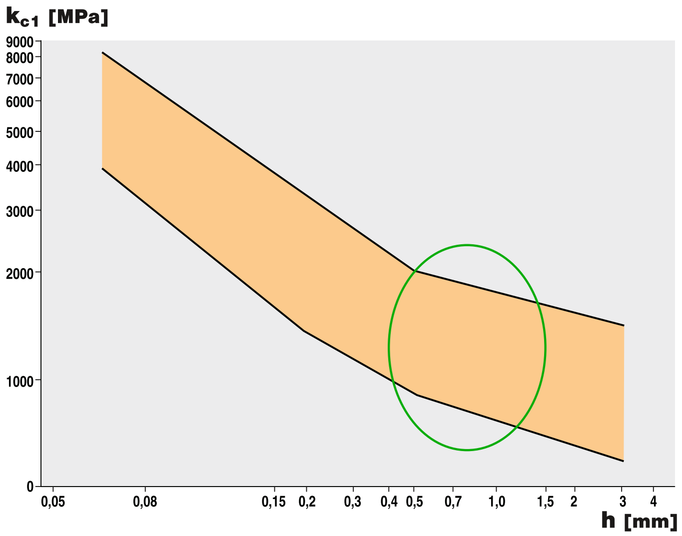


$$h = f \cdot \sin K_r$$

$$h = f \cdot \sqrt{\frac{a_p}{INSD}}$$



Dependence of specific cutting resistance kc1 on chip thickness



With decreasing chip thickness, the specific cutting resistance increases! Optimal chip thickness range is marked green on the graph.

We recommend using feeds in the range specified in the product section of this catalogue, which are also available on the insert box.

K_{c1} values for various materials are listed in the table on page 47.

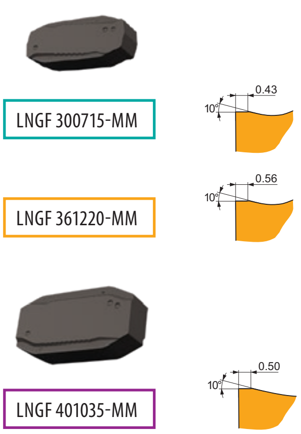
Bar peeling indexable inserts have different cutting-edge geometries in order to create chips with the required shape necessary for smooth removal from the inside of the cutting head. This is one of the most important factors affecting the efficiency of the bar machining process. The wide variety of materials to be machined encourages tool manufacturers to continuously improve both tool geometries and carbide grades.

Detailed information about insert geometry

Different to turning inserts, where the chip breaker has the same design on each insert shape, bar peeling chip breakers differ according to insert shape and size.

Please be aware, the graphs below show ranges of feed per one revolution of peeling head with four cassettes.

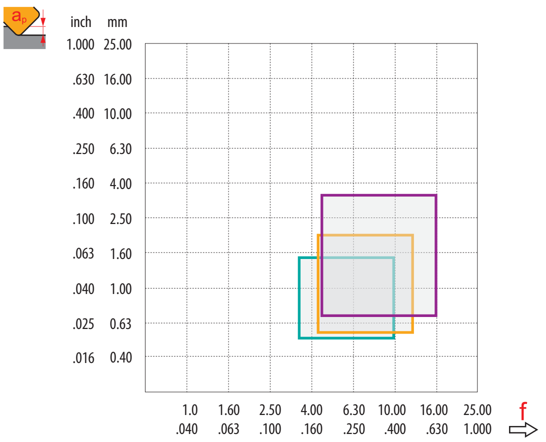
MM



LNGF 300715-MM

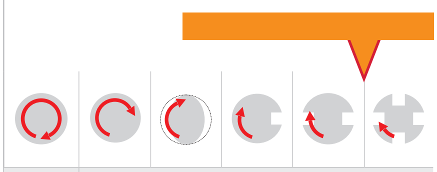
LNGF 361220-MM

LNGF 401035-MM



P	M	K	N	S	H
◩	■			◩	

f	3.60 – 16.00
ap	0.50 – 3.50

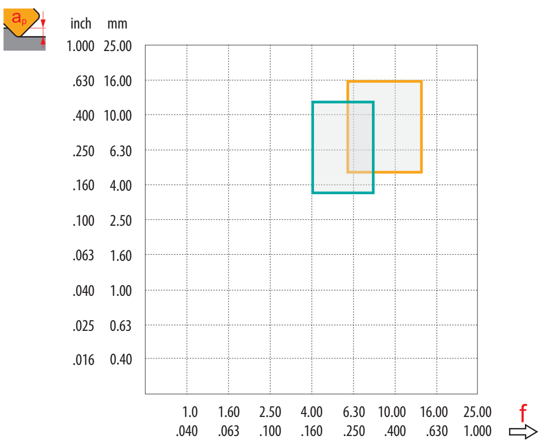


? LNGF 30, LNGF 36, LNGF 40

MM

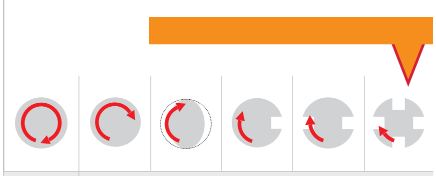
RNGH 381200-MM

RNGH 5018MO-MM



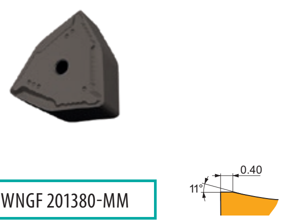
P	M	K	N	S	H
◩	■			◩	

f	4.00 – 12.00
ap	3.00 – 16.00

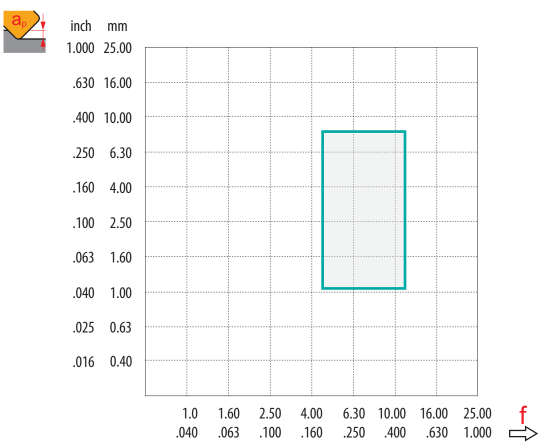


? RNGH 38, RNGH 50

MM

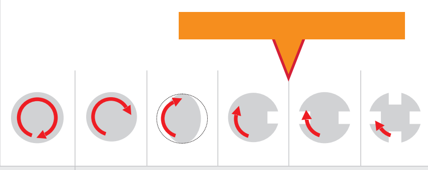


WNGF 201380-MM



P	M	K	N	S	H
◩	■			◩	

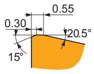
f	4.80 – 12.00
ap	1.00 – 8.00



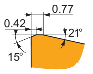
? WNGF 20

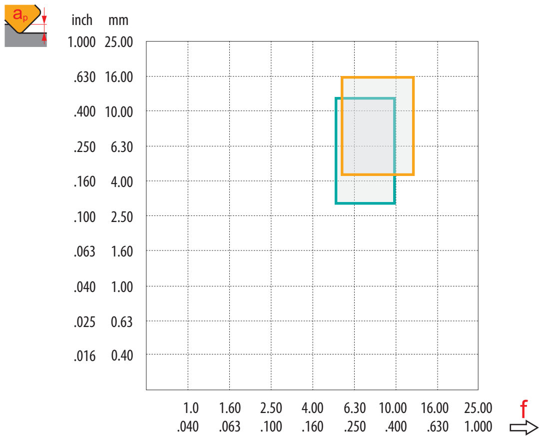
MR

RNGH 381200-MR



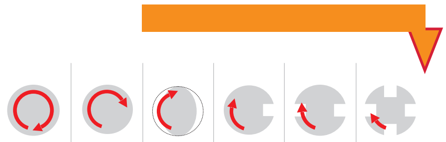
RNGH 5018MO-MR





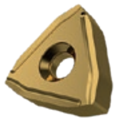
P	M	K	N	S	H
◩	■			◩	

f	5.00 – 12.00
ap	3.00 – 16.00

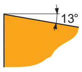


? **RNGH 38, RNGH 50**

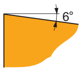
PF

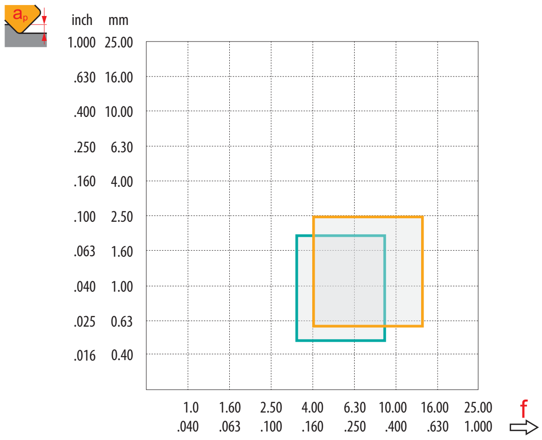


TNGJ 220720-PF



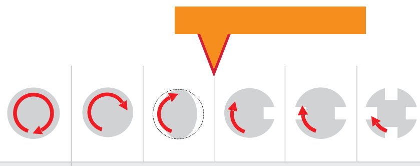
TNGJ 281025-PF





P	M	K	N	S	H
■	◩			◩	

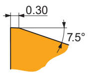
f	3.60 – 14.00
ap	0.50 – 2.50



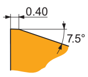
? **TNGJ 22, TNGJ 28**

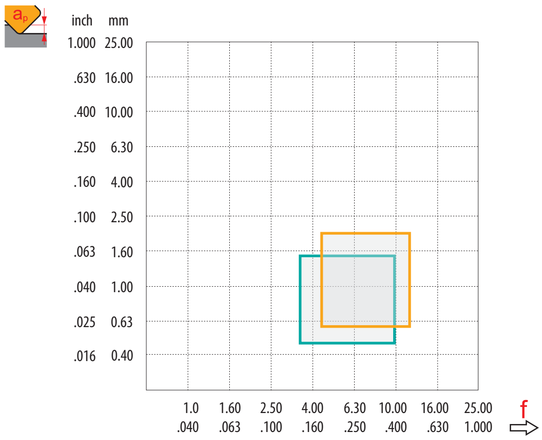
PM

LNGF 300715-PM



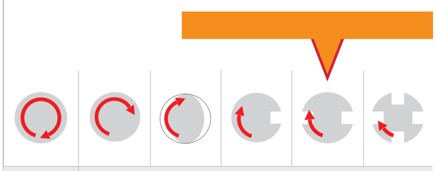
LNGF 361220-PM





P	M	K	N	S	H
■	◩				

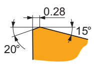
f	3.60 – 12.00
ap	0.50 – 2.00



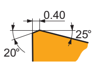
? **LNGF 30, LNGF 36**

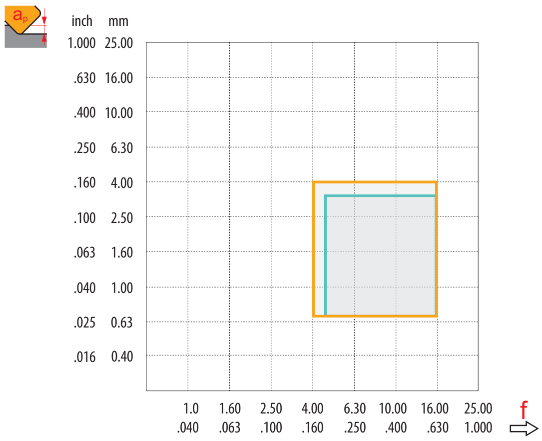
PM

LNGF 401035-PM



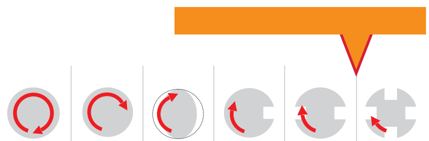
LNXR 381240-PM





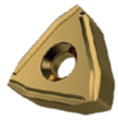
P	M	K	N	S	H
■	◩				

f	4.00 – 16.00
ap	0.70 – 4.00

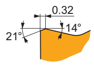


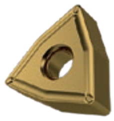
? **LNGF 40, LNXR 38**

PM

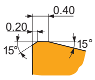


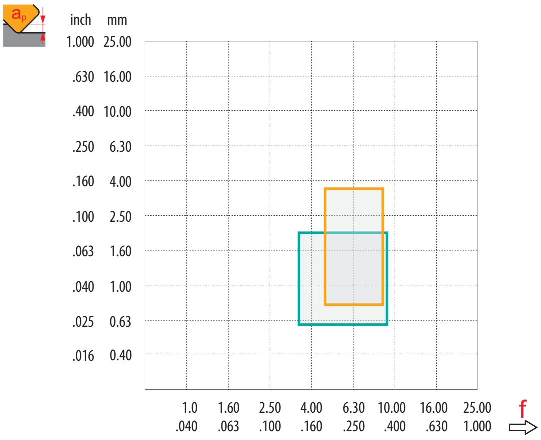
TNGJ 220720-PM





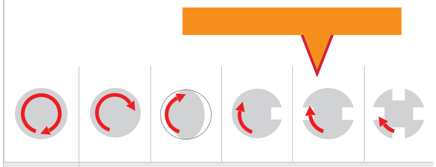
WNGU 150935-PM





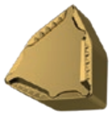
P	M	K	N	S	H
■	◪				

f	3.60 – 9.00
ap	0.50 – 3.50

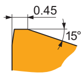


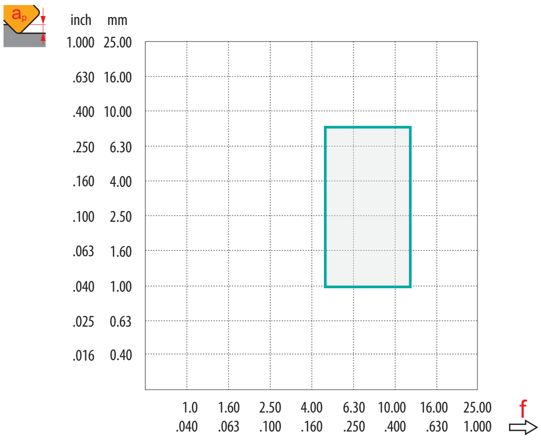
? **TNGJ 22, WNGU 15**

PM



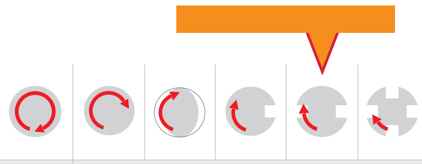
WNMF 201380-PM





P	M	K	N	S	H
■	◪				

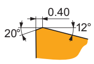
f	4.80 – 12.00
ap	0.50 – 8.00

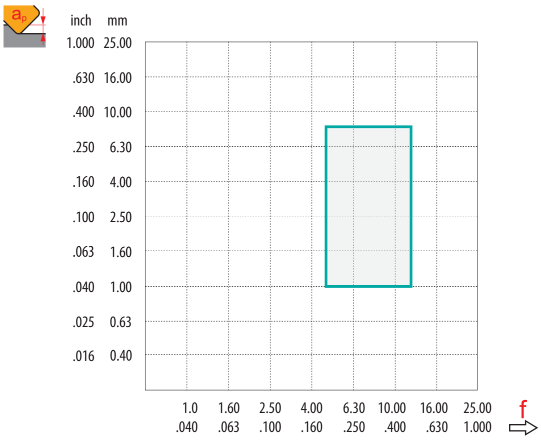


? **WNMF 20**

PR

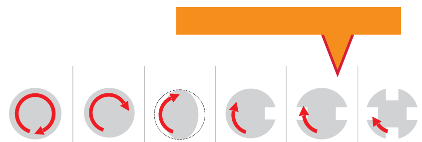
WNMJ 201480-PR
WNXJ 201380-PR





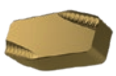
P	M	K	N	S	H
■					

f	4.80 – 12.00
ap	1.00 – 8.00

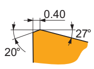


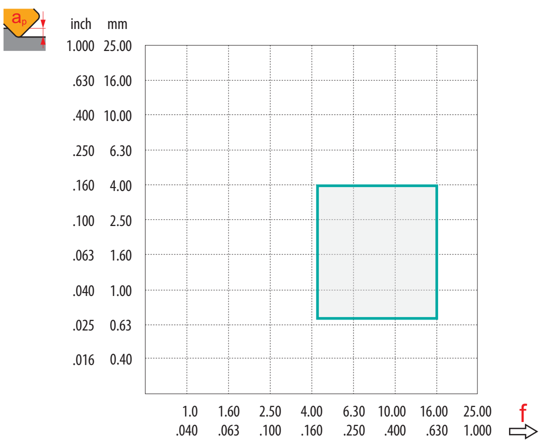
? **WNMJ 20, WNXJ 20**

PR



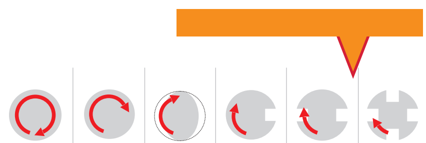
LNXR 381240-PR





P	M	K	N	S	H
■					

f	4.80 – 16.00
ap	0.70 – 4.00



? **LNXR 38**

T 7 3 2 5

T	7	3	2 5
Operation	Coating/Substrate	Generation	ISO range

Operation

D	Drilling
M	Milling
T	Turning
G	Grooving and Parting off

Coating/Substrate

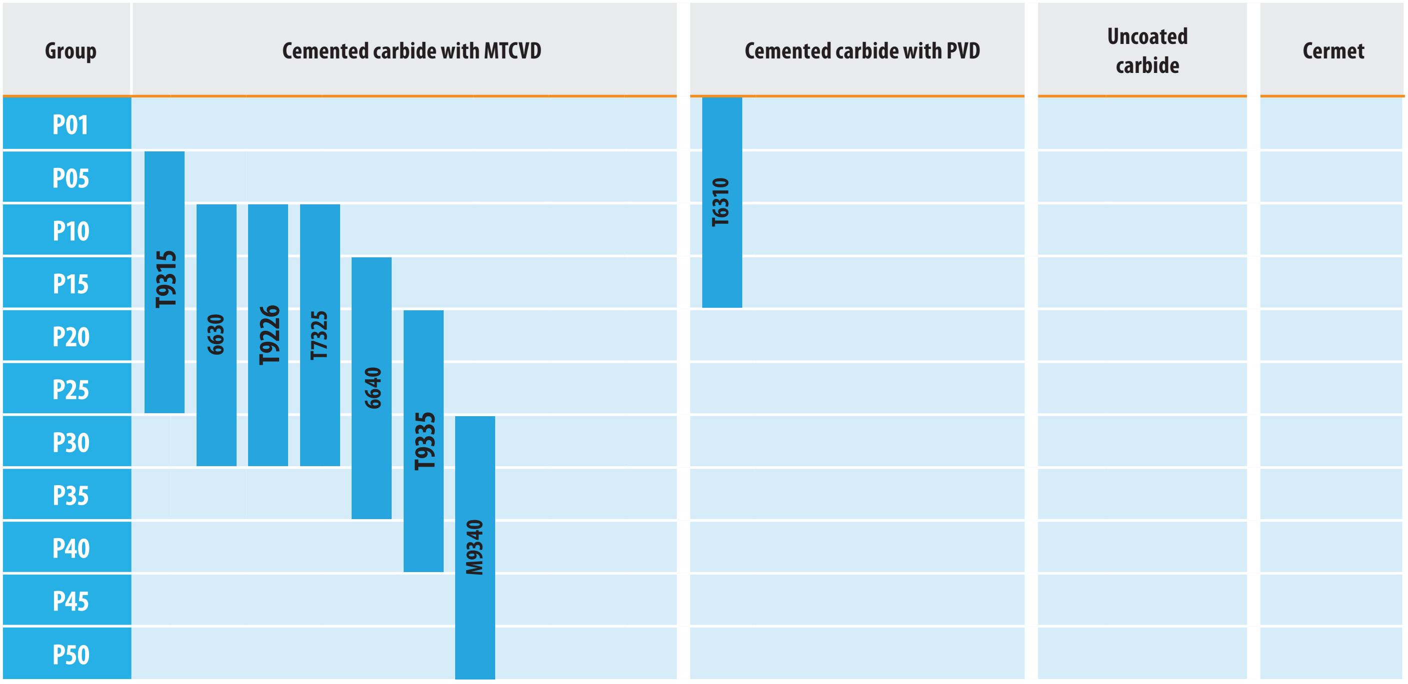
0 PVD 1 CVD	Special application
2 PVD 3 CVD	Free
4 PVD 5 CVD	Group K, H
6 PVD 7 CVD	Group M, S
8 PVD 9 CVD	Universal
B	CBN
C	Ceramic
D	PCD
T	Cermet

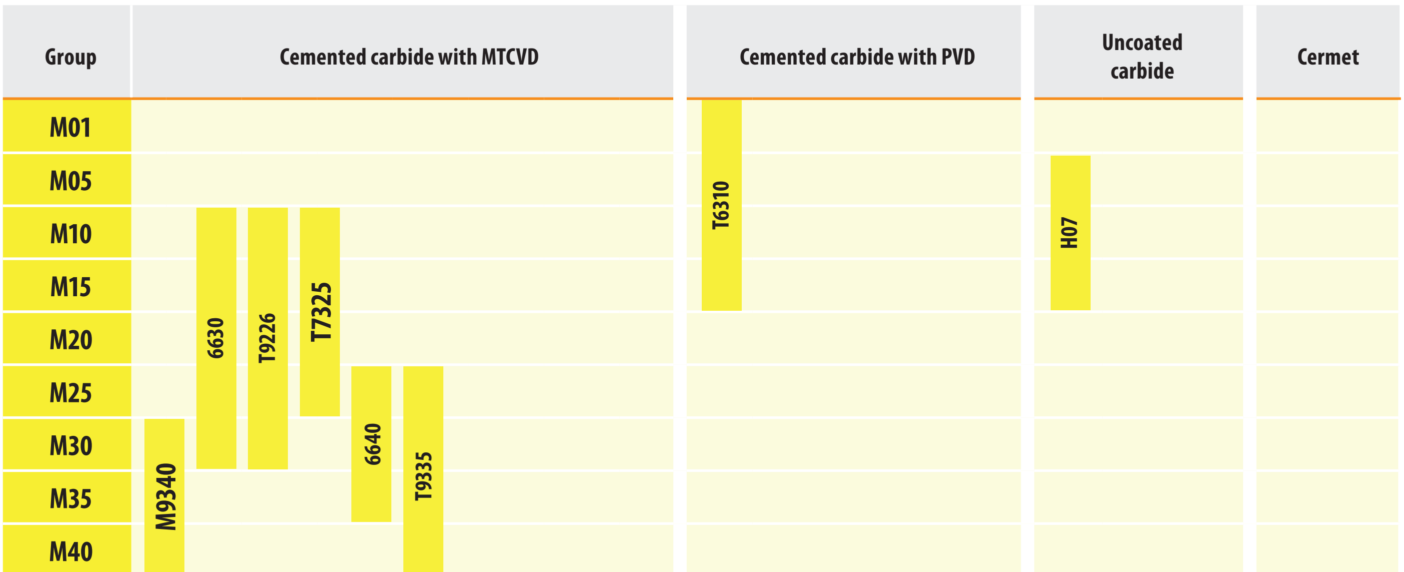
Generation

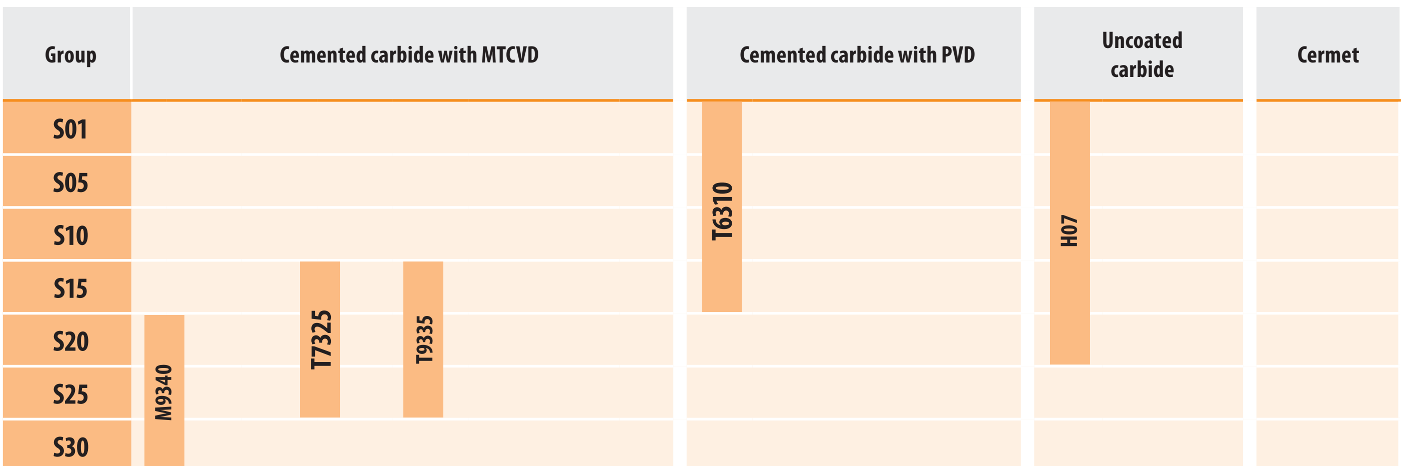
1 – 9

ISO range

01 – 50	
	01 – 05
	05 – 10
	10 – 20
	20 – 30
	30 – 40
	40 – 50


Group
Cemented carbide with MTCVD
Cemented carbide with PVD
Uncoated carbide
Cermet
P01
P05
P10
P15
P20
P25
P30
P35
P40
P45
P50
T9315
6630
T9226
T7325
6640
T9335
M9340
T6310


Group
Cemented carbide with MTCVD
Cemented carbide with PVD
Uncoated carbide
Cermet
M01
M05
M10
M15
M20
M25
M30
M35
M40
M9340
6630
T9226
T7325
6640
T9335
T6310
H07


Group
Cemented carbide with MTCVD
Cemented carbide with PVD
Uncoated carbide
Cermet
S01
S05
S10
S15
S20
S25
S30
M9340
T7325
T9335
T6310
H07

Grade identification	Area of application	Application	Feed	Cutting speed	Resistance to adverse working conditions	Coating	Color	Substrate	Coolant benefit	Grade description
H07	M05 - M15 K10 - K25 N10 - N30 S01 - S20	◩ ■ ■ ■				×		submicron H	+ +	Uncoated turning grade suitable for machining applications where oxidation resistance is not dominating criterion of tool life. Designed for machining of Ti-based alloys. Grade exhibits high strength of cutting edge together with good wear resistance.
6630	P15 - P35 M10 - M30 K20 - K30	■ ■ ◩				MT-CVD		FGM	+ + +	A versatile turning grade which is particularly suitable for applications with medium to low cutting speeds and medium to higher feed rates. It is an ideal first choice for conventional machines. It can be used for semi-roughing, but also for roughing and finishing operations.
6640	P20 - P40 M20 - M35 K25 - K40	■ ■ ■				MT-CVD		H	+ + +	One of the toughest turning materials which can be used especially in roughing operations, or where operational reliability under adverse cutting conditions is a priority. Another ideal choice for machines working with low to medium cutting speeds and medium to high feed rates.
M9340	P35 – P50 M30 – M40 S15 – S20	■ ■ ■				MT-CVD		H	- - -	A very tough grade, where the main advantage is the high strength of the cutting edge and resistance to adverse cutting conditions. Although this material has an MT-CVD M30 – M40 coating, it is possible to use emulsion cooling for its application, especially in optimum cutting conditions.
T6310	P01 - P15 M01 - M15 K05 - K20 N05 - N20 S01 - S15 H01 - H15	■ ■ ■ ■ ■ ■				PVD		ultra submicron H	+ + +	High wear resistant turning grade with top PVD coating. Suitable for finishing operation and applications, where sharp cutting edge together with high flank wear resistance is of high importance
T7325	P15 - P35 M10 - M25 S10 - S25	◩ ■ ■				MT-CVD		FGM	+ + +	One of the most universal turning grades. Especially designed for stainless steel machining. Optimal balance between wear resistance and performance reliability. Suitable for broad variety of application in turning operations.
T9226	P15 - P35 M10 - M30 K15 - K35	■ ◩ ◩				MT-CVD		FGM	+ + +	Grade designed for heavy roughing applications. A versatile grade with high resistance to mechanical damage and retrains very good wear resistance. Usable at lower cutting speeds.
T9315	P05 - P25 K05 - K25 H10 - H20	■ ◩ ◩				MT-CVD		FGM	+ +	A versatile grade with excellent wear resistance properties even under intense cutting conditions. It can also be used for operations with interrupted cuts. With it's well balanced properties this grade can be first choice for a wide range of turning operations. Not suited to low cutting speeds.

Substrate	
H	WC-Co based substrate
submicron H	WC-Co based substrate fine grained (< 1 µm)
ultra submicron H	WC-Co based substrate very fine grained (< 0.5 µm)
FGM	Functionally graded substrate

Benefits of cutting fluid	
+ + +	Use of coolant is essential
+ +	Highly recommended
+	Recommended
+ / –	Optional
- -	Do not use coolant
–	Coolant not recommended

Coating	
MT-CVD	Medium-temperature chemical method of coating
PVD	Low-temperature physical method of coating
×	Uncoated grade

Attribute Strength	
	Level 1 – 5

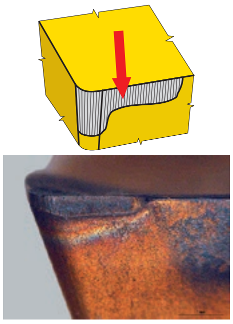
Designation	Apl. area	Apl. area	Apl. area	Apl. area	Apl. area	Apl. area	f_z min	f_{rev} max	a_p min	a_p max	f_z min	f_{rev} max	a_p min	a_p max	f_z min	f_{rev} max	a_p min	a_p max	Vc min	Vc max	Vc min	Vc max	Vc min	Vc max
LNGF 300715–MM–S01:T6310	■	■	◩	P01–P15	M01–M15	S01–S15	0.90	10.00	0.5	1.5	0.99	9.00	0.5	1.5	0.99	7.00	0.5	1.2	45	90	35	65	10	30
LNGF 300715–MM–S01:T7325	◩	■	◩	P15–P35	M10–M25	S10–S25	0.90	10.00	0.5	1.5	0.99	9.00	0.5	1.5	0.99	7.00	0.5	1.2	70	135	55	105	15	50
LNGF 300715–MM–S01:T9315	■	–	–	P05–P25	–	–	0.90	10.00	0.5	1.5	–	–	–	–	–	–	–	–	55	145	–	–	–	–
LNGF 300715–MM–S02:T7325	◩	■	◩	P15–P35	M10–M25	S10–S25	0.90	10.00	0.5	1.5	0.99	9.00	0.5	1.5	0.99	7.00	0.5	1.2	70	135	55	105	15	50
LNGF 300715–MM–S03:T7325	◩	■	◩	P15–P35	M10–M25	S10–S25	0.90	10.00	0.5	1.5	0.99	9.00	0.5	1.5	0.99	7.00	0.5	1.2	70	135	55	105	15	50
LNGF 300715–PM:6630	■	◩	–	P15–P35	M10–M30	–	0.90	10.00	0.5	1.5	0.99	9.00	0.5	1.5	–	–	–	–	40	115	20	70	–	–
LNGF 300715–PM:T6310	■	◩	–	P01–P15	M01–M15	–	0.90	10.00	0.5	1.5	0.99	9.00	0.5	1.5	–	–	–	–	45	90	35	65	–	–
LNGF 300715–PM:T7325	◩	◩	–	P15–P35	M10–M25	–	0.90	10.00	0.5	1.5	0.99	9.00	0.5	1.5	–	–	–	–	70	135	55	105	–	–
LNGF 300715–PM:T9226	■	◩	–	P15–P35	M10–M30	–	0.90	10.00	0.5	1.5	0.99	9.00	0.5	1.5	–	–	–	–	40	115	20	70	–	–
LNGF 300715–PM:T9315	■	–	–	P05–P25	–	–	0.90	10.00	0.5	1.5	–	–	–	–	–	–	–	–	55	145	–	–	–	–
LNGF 300715–PM–S02:T7325	◩	◩	–	P15–P35	M10–M25	–	0.90	10.00	0.5	1.5	0.99	9.00	0.5	1.5	–	–	–	–	70	135	55	105	–	–
LNGF 300715–PM–S03:T7325	◩	◩	–	P15–P35	M10–M25	–	0.90	10.00	0.5	1.5	0.99	9.00	0.5	1.5	–	–	–	–	70	135	55	105	–	–
LNGF 361220–MM–S01:T6310	■	■	◩	P01–P15	M01–M15	S01–S15	1.15	12.00	0.6	2.0	1.27	10.80	0.6	2.0	1.27	8.40	0.6	1.6	50	100	35	70	10	35
LNGF 361220–MM–S01:T7325	◩	■	◩	P15–P35	M10–M25	S10–S25	1.15	12.00	0.6	2.0	1.27	10.80	0.6	2.0	1.27	8.40	0.6	1.6	60	140	45	110	15	55
LNGF 361220–MM–S01:T9315	■	–	–	P05–P25	–	–	1.15	12.00	0.6	2.0	–	–	–	–	–	–	–	–	50	150	–	–	–	–
LNGF 361220–MM–S02:T7325	◩	■	◩	P15–P35	M10–M25	S10–S25	1.15	12.00	0.6	2.0	1.27	10.80	0.6	2.0	1.27	8.40	0.6	1.6	60	140	45	110	15	55
LNGF 361220–MM–S02:T9315	◩	–	–	P05–P25	–	–	1.15	12.00	0.6	2.0	–	–	–	–	–	–	–	–	50	150	–	–	–	–
LNGF 361220–MM–S03:T7325	◩	■	◩	P15–P35	M10–M25	S10–S25	1.15	12.00	0.6	2.0	1.27	10.80	0.6	2.0	1.27	8.40	0.6	1.6	60	140	45	110	15	55
LNGF 361220–MM–S03:T9315	◩	–	–	P05–P25	–	–	1.15	12.00	0.6	2.0	–	–	–	–	–	–	–	–	50	150	–	–	–	–
LNGF 361220–MM–S04:H07	–	◩	◩	–	M05–M15	S01–S20	–	–	–	–	1.27	10.80	0.6	2.0	1.15	12.00	0.6	1.6	–	–	10	40	5	25
LNGF 361220–PM:6630	■	◩	–	P15–P35	M10–M30	–	1.15	12.00	0.6	2.0	1.27	10.80	0.6	2.0	–	–	–	–	40	120	25	70	–	–
LNGF 361220–PM–S01:T7325	◩	◩	–	P15–P35	M10–M25	–	1.15	12.00	0.6	2.0	1.27	10.80	0.6	2.0	–	–	–	–	60	140	45	110	–	–
LNGF 361220–PM–S01:T9315	■	–	–	P05–P25	–	–	1.15	12.00	0.6	2.0	–	–	–	–	–	–	–	–	50	150	–	–	–	–
LNGF 361220–PM–S02:T7325	◩	◩	–	P15–P35	M10–M25	–	1.15	12.00	0.6	2.0	1.27	10.80	0.6	2.0	–	–	–	–	60	140	45	110	–	–
LNGF 361220–PM–S03:T7325	◩	◩	–	P15–P35	M10–M25	–	1.15	12.00	0.6	2.0	1.27	10.80	0.6	2.0	–	–	–	–	60	140	45	110	–	–
LNGF 401035–MM–S01:T6310	■	■	◩	P01–P15	M01–M15	S01–S15	1.20	16.00	0.7	3.5	1.32	14.40	0.7	3.5	1.32	11.20	0.7	2.8	50	105	35	75	10	35
LNGF 401035–MM–S01:T7325	◩	■	◩	P15–P35	M10–M25	S10–S25	1.20	16.00	0.7	3.5	1.32	14.40	0.7	3.5	1.32	11.20	0.7	2.8	65	150	50	115	15	55
LNGF 401035–MM–S01:T9315	■	–	–	P05–P25	–	–	1.20	16.00	0.7	3.5	–	–	–	–	–	–	–	–	50	150	–	–	–	–
LNGF 401035–MM–S02:T7325	◩	■	◩	P15–P35	M10–M25	S10–S25	1.20	16.00	0.7	3.5	1.32	14.40	0.7	3.5	1.32	11.20	0.7	2.8	65	150	50	115	15	55
LNGF 401035–MM–S03:T7325	◩	■	◩	P15–P35	M10–M25	S10–S25	1.20	16.00	0.7	3.5	1.32	14.40	0.7	3.5	1.32	11.20	0.7	2.8	65	150	50	115	15	55
LNGF 401035–PM–S01:6630	■	◩	–	P15–P35	M10–M30	–	1.20	16.00	0.7	3.5	1.32	14.40	0.7	3.5	–	–	–	–	40	120	20	70	–	–
LNGF 401035–PM–S01:T7325	◩	◩	–	P15–P35	M10–M25	–	1.20	16.00	0.7	3.5	1.32	14.40	0.7	3.5	–	–	–	–	65	150	50	115	–	–
LNGF 401035–PM–S01:T9226	■	◩	–	P15–P35	M10–M30	–	1.20	16.00	0.7	3.5	1.32	14.40	0.7	3.5	–	–	–	–	30	130	15	75	–	–
LNGF 401035–PM–S01:T9315	■	–	–	P05–P25	–	–	1.20	16.00	0.7	3.5	–	–	–	–	–	–	–	–	50	150	–	–	–	–
LNGF 401035–PM–S02:T7325	◩	◩	–	P15–P35	M10–M25	–	1.20	16.00	0.7	3.5	1.32	14.40	0.7	3.5	–	–	–	–	65	150	50	115	–	–
LNGF 401035–PM–S03:T7325	◩	◩	–	P15–P35	M10–M25	–	1.20	16.00	0.7	3.5	1.32	14.40	0.7	3.5	–	–	–	–	65	150	50	115	–	–
LNXR 381240–PM:T9315	■	–	–	P05–P25	–	–	1.00	16.00	0.7	4.0	–	–	–	–	–	–	–	–	50	190	–	–	–	–
LNXR 381240–PR:6630	■	–	–	P15–P35	–	–	1.20	16.00	0.7	4.0	–	–	–	–	–	–	–	–	30	135	–	–	–	–

ap min may be lower than those given in this table, but then the cutting forces will be greater. For indexable inserts with a CVD coating, it should never be lower than 0.15 mm

RNGH 381200–MM:T6310	■	■	◩	P01–P15	M01–M15	S01–S15	1.00	8.00	3.0	12.0	1.10	7.20	3.0	12.0	1.00	8.00	3.0	9.6	50	100	35	70	10	35
RNGH 381200–MM:T7325	◩	■	◩	P15–P35	M10–M25	S10–S25	1.00	8.00	3.0	12.0	1.10	7.20	3.0	12.0	1.00	8.00	3.0	9.6	70	140	50	110	15	55
RNGH 381200–MM:T9315	■	–	–	P05–P25	–	–	1.00	8.00	3.0	12.0	–	–	–	–	–	–	–	–	60	150	–	–	–	–
RNGH 381200–MR:6640	■	■	–	P20–P40	M20–M35	–	1.25	10.00	3.0	12.0	1.38	9.00	3.0	12.0	–	–	–	–	35	90	20	55	–	–
RNGH 381200–MR:T7325	◩	■	◩	P15–P35	M10–M25	S10–S25	1.25	10.00	3.0	12.0	1.38	9.00	3.0	12.0	1.25	10.00	3.0	9.6	70	135	50	105	15	50
RNGH 381200–MR:T9226	■	■	◩	P15–P35	M10–M30	S15–S25	1.25	10.00	3.0	12.0	1.38	9.00	3.0	12.0	1.25	10.00	3.0	9.6	45	110	25	65	5	25
RNGH 381200–MR:T9315	■	–	–	P05–P25	–	–	1.25	10.00	3.0	12.0	–	–	–	–	–	–	–	–	50	140	–	–	–	–
RNGH 5018MO–MM:M9340	■	■	◩	P30–P50	M20–M40	S20–S30	1.50	12.00	4.5	16.0	1.50	12.00	4.5	16.0	1.50	12.00	4.5	12.8	25	65	15	40	5	20
RNGH 5018MO–MM:T6310	■	■	◩	P01–P15	M01–M15	S01–S15	1.50	12.00	4.5	16.0	1.50	12.00	4.5	16.0	1.50	12.00	4.5	12.8	45	80	30	55	10	25
RNGH 5018MO–MM:T7325	◩	■	◩	P15–P35	M10–M25	S10–S25	1.50	12.00	4.5	16.0	1.50	12.00	4.5	16.0	1.50	12.00	4.5	12.8	60	120	45	95	15	45
RNGH 5018MO–MM:T9315	■	–	–	P05–P25	–	–	1.50	12.00	4.5	16.0	–	–	–	–	–	–	–	–	50	120	–	–	–	–
RNGH 5018MO–MR:M9340	■	■	◩	P30–P50	M20–M40	S20–S30	1.50	12.00	4.5	16.0	1.65	10.80	4.5	16.0	1.50	12.00	4.5	12.8	25	65	15	40	5	20
RNGH 5018MO–MR:T7325	◩	■	◩	P15–P35	M10–M25	S10–S25	1.50	12.00	4.5	16.0	1.65	10.80	4.5	16.0	1.50	12.00	4.5	12.8	60	120	45	95	15	45
RNGH 5018MO–MR:T9335	■	■	◩	P20–P45	M15–M40	S15–S25	1.50	12.00	4.5	16.0	1.65	10.80	4.5	16.0	1.50	12.00	4.5	12.8	35	85	20	50	5	20
TNGJ 220720–PF–S01:T9315	■	–	–	P05–P25	–	–	0.90	9.00	0.5	2.0	–	–	–	–	–	–	–	–	55	165	–	–	–	–
TNGJ 220720–PF–S02:T7325	◩	◩	◩	P15–P35	M10–M25	S10–S25	0.90	9.00	0.5	2.0	0.99	8.10	0.5	2.0	0.99	6.30	0.5	1.6	70	160	50	120	15	60
TNGJ 220720–PM–S01:T9315	■	–	–	P05–P25	–	–	0.90	9.00	0.5	2.0	–	–	–	–	–	–	–	–	55	165	–	–	–	–
TNGJ 220720–PM–S02:T7325	◩	◩	–	P15–P35	M10–M25	–	0.90	9.00	0.5	2.0	0.99	8.10	0.5	2.0	–	–	–	–	70	160	50	120	–	–
TNGJ 220720–PM–S02:T9226	■	◩	–	P15–P35	M10–M30	–	0.90	9.00	0.5	2.0	0.99	8.10	0.5	2.0	–	–	–	–	40	140	20	80	–	–
TNGJ 220720–PM–S02:T9315	■	–	–	P05–P25	–	–	0.90	9.00	0.5	2.0	–	–	–	–	–	–	–	–	55	165	–	–	–	–
TNGJ 281025–PF–S01:6630	■	◩	◩	P15–P35	M10–M30	S15–S25	1.00	14.00	0.6	2.5	1.10	12.60	0.6	2.5	1.10	9.80	0.6	2.0	35	125	20	75	5	35
TNGJ 281025–PF–S01:T9226	■	◩	◩	P15–P35	M10–M30	S15–S25	1.00	14.00	0.6	2.5	1.10	12.60	0.6	2.5	1.10	9.80	0.6	2.0	35	130	20	75	5	30
TNGJ 281025–PF–S01:T9315	■	–	–	P05–P25	–	–	1.00	14.00	0.6	2.5	–	–	–	–	–	–	–	–	40	160	–	–	–	–
TNGJ 281025–PF–S02:T7325	◩	◩	◩	P15–P35	M10–M25	S10–S25	1.00	14.00	0.6	2.5	1.10	12.60	0.6	2.5	1.10	9.80	0.6	2.0	55	145	40	110	10	55
TNGJ 281025–PF–S03:T7325	◩	◩	◩	P15–P35	M10–M25	S10–S25	1.00	14.00	0.6	2.5	1.10	12.60	0.6	2.5	1.10	9.80	0.6	2.0	55	145	40	110	10	55
WNGF 201380–MM–S01:T6310	■	■	◩	P01–P15	M01–M15	S01–S15	1.20	12.00	1.0	8.0	1.32	10.80	1.0	8.0	1.20	12.00	1.0	6.4	45	105	30	75	10	35
WNGF 201380–MM–S01:T7325	◩	■	◩	P15–P35	M10–M25	S10–S25	1.20	12.00	1.0	8.0	1.32	10.80	1.0	8.0	1.20	12.00	1.0	6.4	65	145	50	110	15	55
WNGF 201380–MM–S01:T9315	■	–	–	P05–P25	–	–	1.20	12.00	1.0	8.0	–	–	–	–	–	–	–	–	45	155	–	–	–	–
WNGF 201380–MM–S02:T7325	◩	■	◩	P15–P35	M10–M25	S10–S25	1.20	12.00	1.0	8.0	1.32	10.80	1.0	8.0	1.20	12.00	1.0	6.4	65	145	50	110	15	55
WNGF 201380–MM–S03:M9340	◩	■	◩	P30–P50	M20–M40	S20–S30	1.20	12.00	1.0	8.0	1.32	10.80	1.0	8.0	1.20	12.00	1.0	6.4	25	80	15	45	5	20
WNGU 150935–PM–S02:6630	■	◩	–	P15–P35	M10–M30	–	1.15	9.00	0.8	3.5	1.15	9.00	0.8	3.5	–	–	–	–	45	140	25	80	–	–
WNGU 150935–PM–S02:T9226	■	◩	–	P15–P35	M10–M30	–	1.15	9.00	0.8	3.5	1.15	9.00	0.8	3.5	–	–	–	–	45	140	25	80	–	–
WNMF 201380–PM–S01:6630	■	◩	–	P15–P35	M10–M30	–	1.20	12.00	1.0	8.0	1.32	10.80	1.0	8.0	–	–	–	–	40	120	20	70	–	–
WNMF 201380–PM–S01:T9226	■	◩	–	P15–P35	M10–M30	–	1.20	12.00	1.0	8.0	1.32	10.80	1.0	8.0	–	–	–	–	40	120	20	70	–	–
WNMJ 201380–PR:T9226	■	–	–	P15–P35	–	–	1.20	12.00	1.0	8.0	–	–	–	–	–	–	–	–	40	120	–	–	–	–
WNMJ 201480–PR:6630	■	–	–	P15–P35	–	–	1.20	12.00	1.0	8.0	–	–	–	–	–	–	–	–	40	120	–	–	–	–
WNMJ 201480–PR:T9226	■	–	–	P15–P35	–	–	1.20	12.00	1.0	8.0	–	–	–	–	–	–	–	–	40	120	–	–	–	–
WNXJ 150935–PM:6630	■	◩	–	P15–P35	M10–M30	–	1.15	9.00	0.8	3.5	1.15	9.00	0.8	3.5	–	–	–	–	45	140	25	80	–	–
WNXJ 201380–PR–S01:6630	■	–	–	P15–P35	–	–	1.20	12.00	1.0	8.0	–	–	–	–	–	–	–	–	40	120	–	–	–	–

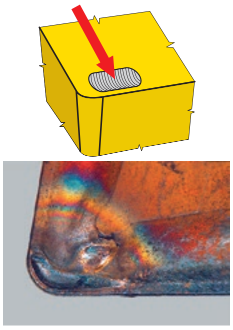
ap min may be lower than those given in this table, but then the cutting forces will be greater. For indexable inserts with a CVD coating, it should never be lower than 0.15 mm

FLANK WEAR



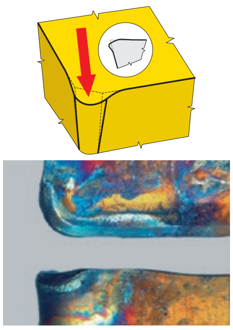
	↑	Use a more wear resistant substrate (s)
(MT)CVD PVD	+ +	Any coating (decisive factor is oxidation resistance – α Al_2O_3)
f	↑	Feed has influence on shape and position of groove
v	↓	Decrease cutting speed
a_p	+	It has no influence
	↑	Increase the clearance angle
		Use coolant or increase its intensity

CRATERING



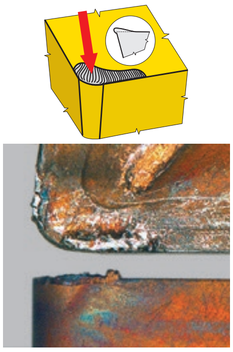
	↑	Use a more wear resistant substrate (s)
(MT)CVD PVD	+ +	Any coating (decisive factor is thermal resistance – α Al_2O_3)
f	↑	Feed has influence on shape and position of crater
v	↓	Decrease cutting speed
a_p	↓	Minimal effect
	↑	Use more positive cutting geometry
	+ +	Use coolant or increase its intensity

PLASTIC DEFORMATION



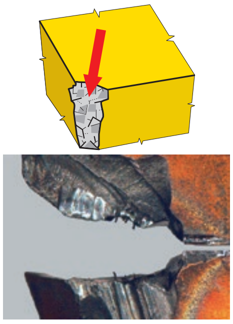
	↑	Use a more wear resistant grade (decisive factor is content of Co)
(MT)CVD PVD	+	Any coating (decisive factor is friction)
f	↓	Decrease feed rate
v	↓	Decrease cutting speed
a_p	↓	Minimal effect
	↑	Use another (more positive) cutting geometry
	+ +	Use coolant or increase its intensity

BUILT–UP EDGE



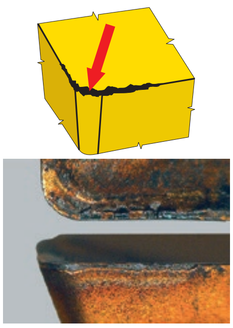
		It has no influence
(MT)CVD PVD	+ +	Any coating (decisive factor is anti-adhesion effect)
f	↑	The higher the feed rate the less probability of built-up edge creation.
v	↓↑	Change (generally increase) the cutting speed.
a_p		It has no influence
	↓↑	Use more positive geometry
	-	Use a coolant with more effective anti-sticking properties (or no coolant at all)

INSERT FRACTURE



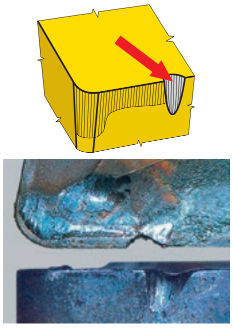
	↓	(H) grain has a great influence
(MT)CVD PVD	+	PVD coating recommended
f	↓	Reduces the force load
v	↑↓	It is about swarf control and vibration
a_p	↓	Reduces the force load
	↓	Use less positive cutting geometry
		It has no influence
		Use better working conditions

BRITTLE CRACKS AT THE CUTTING EDGE



	↓	(H) grain has a great influence
(MT)CVD PVD	+	PVD coating recommended
f	↓	Good swarf control is very important
v	↑↓	It is about swarf control and vibration
a_p	↓	Reduces the force load (important for machining with long overhangs)
	↓	Use less positive cutting geometry; Use insert with wider T-land
		It has no influence

SIDE FLANK NOTCH – REMEDY



	↑ ↓	It depends on the character of the damage (abrasive – use more wear resistant substrate; breaking – use tougher substrate)
(MT)CVD PVD	+ +	CVD coating (decisive factor is oxidation resistance – α Al_2O_3)
f	↓	Feed has influence on intensity, but less than the cutting speed
V	↓	Decrease cutting speed
	↓	Minimal effect
	+	Use another (more positive) cutting geometry
		Use tool with smaller setting angle

NON – CIRCULAR BAR CROSS SECTION

Description:

- uneven bar surface (unstable depth of cut)
- non adjusted tool (incorrectly fixed inserts)
- bars are not brought into peeling head by coaxial way

Troubleshooting:

- check value of cutting depth–(noncircular raw) product = (noncircular final bar)
- check inserts clamping and slide of cartridge or toolholder
- check entry rollers adjustment
- check outgoing rollers adjustment

VIBRATIONS

- guide rollers are adjusted incorrectly
- smoothing edge is too sharp
- small damping facet on smoothing edge
- cutting edge is under axis
- too thin chips (insufficient feed rate)
- uneven or too high wear of inserts

- check leading rollers adjustment
- increase cutting edge rounding
- increase support facet on flank surface facet
- check cutting edge position (to axis or above axis)
- increase feed rate „f“ (mm/rev)
- check insert adjustment

POOR SURFACE (HELICAL TRACE)

- insert clamping is incorrect, worn insert pocket
- feed „f“ (mm/rev) is bigger than length of smoothing edge
- smoothing edge is not parallel to bar axis

- check adjustment and wear of insert (change insert)
- decrease feed rate „f“ (mm/rev)
- check insert adjustment

BAD CHIP FORMATION

- too low feed per insert
- not enough coolant
- incorrect geometry of insert

- increase the feed per insert
- increase coolant efficiency
- change insert geometry

UNEVEN WEAR BETWEEN INDEXABLE INSERTS

- different depth of cut for each indexable insert
- tool holder with damaged insert pocket
- insert clamped incorrectly

- check the tool-holders pre-adjustment
- use only tool-holder in good condition (change the shims if applied)
- clean the inset pocket properly before clamping of new insert

Value	Unit	Formula
Number of revolutions	[rev/min]	$n = \dfrac{v_c \,.\, 1000}{DC \,.\, p}$
Cutting speed	[m/min]	$v_c = \dfrac{\pi \,.\, DC \,.\, n}{1000}$
Feed per revolution	[mm/rev]	$f_{rev} = \dfrac{f_{min}}{n} = f_z \,.\, z$
Feed per minute (speed of feed)	[mm/min]	$f_{min} = v_f = f_{rev} \,.\, n = f_z \,.\, z \,.n$
Feed per one tool-holder in peeling head	[mm/tooth]	$f_z = \dfrac{f_{rev}}{z} = \dfrac{f_{min}}{n \,.\, z}$
Chip cross section	[mm²]	$A = f_z \,.\, a_p$
Chip thickness (for inserts with a straight cutting edge)	[mm]	$h = f_z \,.\, \sin k_r$
Chip thickness (for round cutting inserts)	[mm]	$h = f_z \,.\sqrt{\dfrac{a_p}{INSD}}$
Metal removal rate	[cm³/min]	$Q = a_p \,.\, f_{rev} \,.\, v_c$
Power demand	[kW]	$P_c = \dfrac{a_p \,.\, f_z \,.\, v_c \,.\, \dfrac{k_{c1}}{h^{mc}}}{60000\,\eta} \,.\, Z$

Note:

	Quantity	Unit
n	Number of revolutions	[rev/min]
DC	Diameter (of work piece)	[mm]
v_c	Cutting speed	[m/min]
f_{rev}	Feed per revolution of peeling head	[mm/rev]
A	Chip cross section (per one tool-holder / cassette)	[mm²]
a_p	Axial depth of cut (depth of cut)	[mm]
KRINS	Setting angle of insert main cutting edge	[°]
f_{min}	Feed per minute (sometimes called speed of feed)	[mm/min]
f_z	Feed per tooth (one tool-holder)	[mm/tooth]
z	Number of teeth (tool-holder)	[-]
INSD	Diameter of insert	[mm]

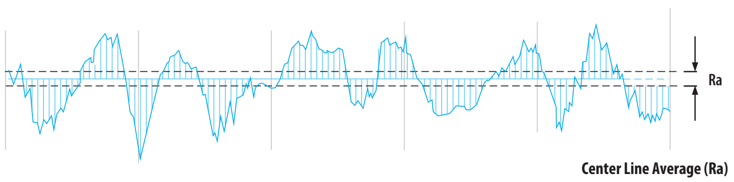
	Quantity	Unit
h	Chip thickness	[mm]
Q	Material removal rate per minute	[cm³/min]
Pc	Power demand	[kW]
kc1	Specific cutting force per 1 mm2 chip cross-section (see the table at page 47)	[MPa]
kc	Specific cutting force according to chip cross-section and thickness	[MPa]
η	Machine efficiency usually η = 0,65	[-]
mc	Exponent related to work piece material - (see the table at page 47)	[-]

SPECIFIC CUTTING FORCE TABLE

TABLE

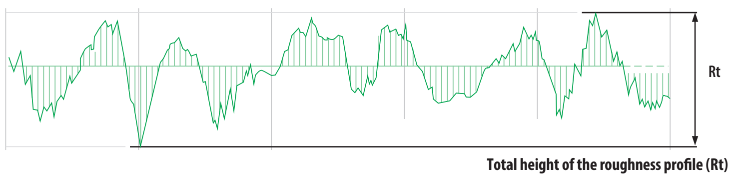
				Ultimate tensile strength Mpa (N/mm^2)	Specific Cutting force kc1 N/mm2	Increase Value mc
P	P1	P1.1	Free machining sulfurized carbon steel with a hardness of < 240 HB	≤ 830	1500	0.24
		P1.2	Free machining sulfurized and phosphorized carbon steel with a hardness of < 180 HB	≤ 620	1250	0.24
		P1.3	Free machining sulfurized/phosphorized and leaded carbon steel with a hardness of <180 HB	≤ 620	1250	0.24
	P2	P2.1	Plain low carbon steel containing < 0.25 %C with a hardness of < 180 HB	≤ 620	1250	0.24
		P2.2	Plain medium carbon steel containing < 0.55%C with a hardness of < 240 HB	≤ 830	1500	0.24
		P2.3	Plain high carbon steel containing > 0.55%C, with a hardness of < 300HB	≤ 1030	1650	0.24
	P3	P3.1	Alloy steel with a hardness of < 190 HB	≤ 620	1550	0.24
		P3.2	Alloy steel with a hardness of 180–260 HB	> 620 ≤ 900	1650	0.24
		P3.3	Alloy steel with a hardness of 260–360 HB	> 900 ≤ 1240	1750	0.24
	P4	P4.1	Tool steel with a hardness of < 26 HRC	≤ 900	1800	0.24
		P4.2	Tool steel with a hardness of 26-39 RC	> 900 ≤ 1240	2000	0.24
		P4.3	Tool steel with a hardness of 39-45 HRC	> 1250 ≤ 1450	2300	0.24
M	M1	M1.1	Stainless steel, ferritic with a hardness of < 160 HB	≤ 520	1750	0.20
		M1.2	Staintess steel, ferritic with a hardness of 160–220 HB	> 520 ≤ 700	1950	0.20
	M2	M2.1	Stainless steel, martensitic with a hardness of < 200 HB	> 670	2100	0.20
		M2.2	Stainiess steel, martensitic with a hardness of 200–280 HB	> 670 ≤ 950	2200	0.20
		M2.3	Stainless steel, martensitic with a hardness of 280–380 HB	> 950 ≤ 1300	2450	0.20
	M3	M3.1	Stainless steel, austenitic with a hardness of < 200 HB	≤ 730	1900	0.20
		M3.2	Stainiess steel, austenitic with a hardness of 200–260 HB	> 750 ≤ 870	2100	0.20
		M3.3	Stainiess steel, austenitic with a hardness of 260-300 HB	> 870 ≤ 1040	2200	0.20
	M4	M4.1	Stainless steel, austenitic-ferritic or super-austenitic with a hardness of < 300 HB	≤ 990	2350	0.20
		M4.2	Stainless steel, precipitation hardening austenitic with a hardness of 300–380 HB	≤ 1320	2500	0.20
S	S1	S1.1	Titanium or titanium alloys, with a hardness of < 200 HB	≤ 660	1400	0.22
		S1.2	Titanium alloys, with a hardness of 200–280 HB	> 660 ≤ 950	1500	0.22
		S1.3	Titanium alloys, a hardness of 280–360 HB	> 950 ≤ 1200	1600	0.22
	S2	S2.1	High-temperature Fe-based alloys with a hardness of < 200 HB	≤ 690	2450	0.24
		S2.2	High-temperature Fe-based alloys with a hardness of 200–280 HB	> 690 ≤ 970	2550	0.24
	S3	S3.1	High-temperature Ni-based alloys with a hardness of < 260 HB	≤ 940	2850	0.24
		S3.2	High-temperature Ni-based alloys with a hardness of 280–360 HB	> 940 ≤ 1200	3100	0.24
	S4	S4.1	High-temperature Co-based alloys with a hardness of < 240HB	≤ 800	2880	0.24
		S4.2	High-temperature Co-based alloys with a hardness of 240–320 HB	>800 ≤ 1070	3100	0.24

At the beginning of this section, we indicate the main roughness parameters most often specified in engineering practice.

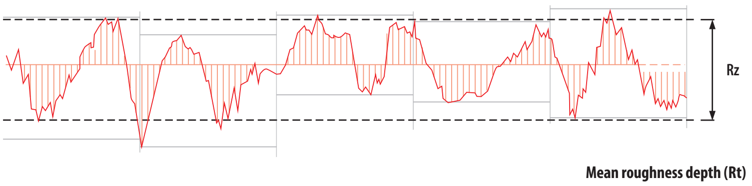


Ra – Average roughness
Ra is also known as Arithmetic Average (AA) or Center Line Average (CLA). It is the average roughness in the area between the roughness profile and its mean line. Graphically, Ra is the area between the roughness profile and its center-line divided by the evaluation length. The evaluation length is normally five sample lengths where each sample length is equal to one cut-off length. As shown in the graph.

Ra is by far the most commonly used Surface Finish parameter and a good starting point for quantifying parts even when there is no parameter callout (surface finish required). However, while common, Ra is not sufficient to completely characterize the roughness of a surface. Depending on the application, surfaces with the same roughness can perform quite differently. Lets look at the same surface roughness analysed in 3 other ways:



Rt – Total height of roughness profile
Difference between height of the highest peak and the depth of the deepest valley within the evaluation length as you can see in the bottom graph.



Rz – Mean roughness depth
Rz is often preferred to Ra in Europe and particularly Germany. Instead of measuring from center-line like Ra, Rz measures the average of the 5 largest peak to valley differences within five sampling lengths. While Ra is relatively insensitive to a few extremes, Rz is quite sensitive since it is the extremes it is designed to measure.

Surface Roughness Grades: “N” Numbers

The N numbers are common used on technical drawings to described the surface finish roughness. In the past triangles where used but the are not so concrete to explain the correct surface finish.

Table 2

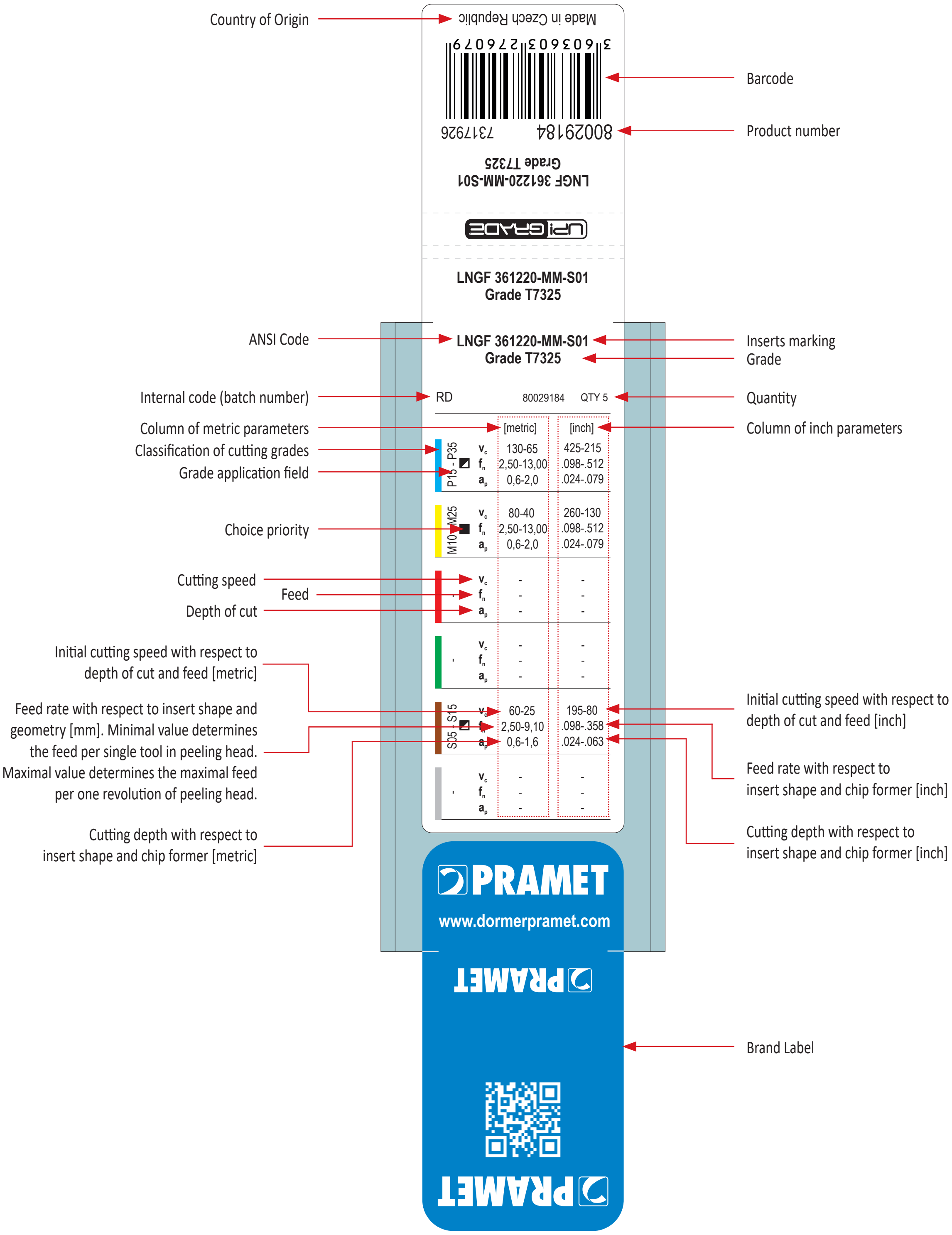
Relationship with Triangle Symbol

Arithmetical Mean Roughness Ra (µm)	Max. height Roughness Rz (µm)	Ten Points Mean Roughness Rz (µm)	Roughness Grade	Note: (Relationship) with triangle)
0.025	0.1	0.1	N1	VVVV
0.05	0.2	0.2	N2	
0.1	0.4	0.4	N3	
0.2	0.8	0.8	N4	
0.4	1.6	1.6	N5	VVV
0.8	3.2	3.2	N6	
1.6	6.3	6.3	N7	
3.2	12.5	12.5	N8	VV
6.3	25	25	N9	
12.5	50	50	N10	V
25	100	100	N11	

Note: Finishing symbol (Triangle and wave~) was removed from JIS standard in the 1994 Revision.

Strength (MPa)	Hardness			
	BRINELL	VICKERS	ROCKWELL	ROCKWELL
R_m	HB	HV	HRB	HRC
285	86	**90**	1190	–
320	95	**100**	56.2	–
350	105	**110**	62.3	–
385	114	**120**	66.7	–
415	124	**130**	71.2	–
450	133	**140**	75.0	–
480	143	**150**	78.7	–
510	152	**160**	81.7	–
545	162	**170**	85.8	–
575	171	**180**	87.1	–
610	181	**190**	89.5	–
640	190	**200**	91.5	–
675	199	**210**	93.5	–
705	209	**220**	95	–
740	219	**230**	96.7	–
770	228	**240**	98.1	–
800	238	**250**	99.5	–
820	242	**255**	–	23.1
850	252	**265**	–	24.8
880	261	**275**	–	26.4
900	266	**280**	–	27.1
930	276	**290**	–	28.5
950	280	**295**	–	29.2
995	295	**310**	–	31.0
1030	304	**320**	–	32.2
1060	314	**330**	–	33.3
1095	323	**340**	–	34.4
1125	333	**350**	–	35.5
1155	342	**360**	–	36.6

Strength (MPa)	Hardness			
	BRINELL	VICKERS	ROCKWELL	ROCKWELL
R_m	HB	HV	HRB	HRC
1190	352	**370**	–	37.7
1220	361	**380**	–	38.8
1255	371	**390**	–	39.8
1290	380	**400**	–	40.8
1320	390	**410**	–	41.8
1350	399	**420**	–	42.7
1385	409	**430**	–	43.6
1420	418	**440**	–	44.5
1455	428	**450**	–	45.3
1485	437	**460**	–	46.1
1520	447	**470**	–	46.9
1555	456	**480**	–	47.7
1595	466	**490**	–	48.4
1630	475	**500**	–	49.1
1665	485	**510**	–	49.8
1700	494	**520**	–	50.5
1740	504	**530**	–	51.1
1775	513	**540**	–	51.7
1810	523	**550**	–	52.3
1845	532	**560**	–	53.0
1880	542	**570**	–	53.6
1920	551	**580**	–	54.1
1955	561	**590**	–	54.7
1995	570	**600**	–	55.2
2030	580	**610**	–	55.7
2070	589	**620**	–	56.3
2105	599	**630**	–	56.8
2145	608	**640**	–	57.3
2180	618	**650**	–	57.8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80029184
QTY 5
Quantity
Column of metric parameters
Column of inch parameters
[metric]
[inch]
Classification of cutting grades
Grade application field
P15 - P35
130-65
2,50-13,00
0,6-2,0
425-215
.098-.512
.024-.079
Choice priority
M10 - M25
80-40
2,50-13,00
0,6-2,0
260-130
.098-.512
.024-.079
Cutting speed
Feed
Depth of cut
Initial cutting speed with respect to depth of cut and feed [metric]
Feed rate with respect to insert shape and geometry [mm]. Minimal value determines the feed per single tool in peeling head. Maximal value determines the maximal feed per one revolution of peeling head.
Cutting depth with respect to insert shape and chip former [metric]
S05 - S15
60-25
2,50-9,10
0,6-1,6
195-80
.098-.358
.024-.063
Initial cutting speed with respect to depth of cut and feed [inch]
Feed rate with respect to insert shape and chip former [inch]
Cutting depth with respect to insert shape and chip former [inch]
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