GENERAL TECHNICAL INFORMATION

TOOLONI

INNOTOOL

Innotool, which stands for "Innovative Tooling", is a market leader in indexable milling products.

The high shear geometry design of cutter body and inserts ensures that Innotool performs very well on low powered machines and often the cutting data can be increased considerably due to the soft cutting action.

The range of standard tooling has increased to now also contain a full range of tools for die & mould machining, as well as a range of indexable insert short hole drills.

In addition to the complete range of standard end mills, square shoulder mills, helical end mills, side and face mills and die and mould tooling, INNOTOOL can offer an excellent and fast service for special solutions.

We look forward to being of service.

INNOTOOL

GENERAL TECHNICAL INFORMATION

SURVEY OF INDEXABLE INSERTS WITHIN THEIR APPLICATION RANGE

	Designation	Insert Option	Application Range						Cutter Type
			P	M	K	N (K)	S (M)	H (P/K)	
	AOCT060204FR-P	double-edged, positive, polished and sharp-edged geometry for non-ferrous materials with R0,4				+			EA06D10, FA06D02, IA06D03, IA06M01, SA06D02, SA06D03, SA06E01, SA06M01
	AOCT110304FR-P	double-edged, positive, polished and sharp-edged geometry for non-ferrous materials with R0,4				+			EA11D10, IA11D03, IA11D10, IA11M01, SA11D03, SA11E01, SA11M01
	AOCT110308FR-P	double-edged, positive, polished and sharp-edged geometry for non-ferrous materials with R0,4				+			EA11D10, IA11D03, IA11D10, IA11M01, SA11D03, SA11E01, SA11M01
	AOMT060202R	double-edged, positive geometry with R0,2	+	+	+	○	○	○	EA06D10, FA06D02, IA06D03, IA06M01, SA06D02, SA06D03, SA06E01, SA06M01
	AOMT060202R-DT1	single-edged, positive insert with short PCD tip				+			EA06D10, SA06D02, SA06D03, SA06E01, SA06M01
	AOMT060204R	double-edged, positive geometry with R0,4	+	+	+	○	○	○	EA06D10, FA06D02, IA06D03, IA06M01, SA06D02, SA06D03, SA06E01, SA06M01
	AOMT060208R	double-edged, positive geometry with R0,8	+	+	+	○	○	○	EA06D10, FA06D02, IA06D03, IA06M01, SA06D02, SA06D03, SA06E01, SA06M01
	AOMT060216R	double-edged, positive geometry with R1,6	+	+	+	○	○	○	EA06D10, FA06D02, IA06D03, IA06M01, SA06D02, SA06D03, SA06E01, SA06M01
	AOMT110304R	double-edged, positive geometry with R0,4	+	+	+	○	○	○	EA11D10, IA11D03, IA11D10, IA11M01, SA11D03, SA11E01, SA11M01
	AOMT110308R	double-edged, positive geometry with R0,8	+	+	+	○	○	○	EA11D10, IA11D03, IA11D10, IA11M01, SA11D03, SA11E01, SA11M01
	AOMT110316R	double-edged, positive geometry with R1,6	+	+	+	○	○	○	EA11D10, IA11D03, IA11D10, IA11M01, SA11D03, SA11E01, SA11M01
	AOMT110332R	double-edged, positive geometry with R3,2	+	+	+	○	○	○	EA11D10, IA11D03, IA11D10, IA11M01, SA11D03, SA11E01, SA11M01
	AOMT160508FR	double-edged, positive titanium geometry with R0,8		○			+		EA16D10, IA16D10, IA16M01, SA16D03, SA16M01
	AOMT160508R	double-edged, positive geometry with R0,8	+	+	+	○	○	○	EA16D10, IA16D10, IA16M01, SA16D03, SA16M01

+ Preferred choice ○ Second choice

Subject to technical changes

SURVEY OF INDEXABLE INSERTS WITHIN THEIR APPLICATION RANGE

	Designation	Insert Option	Application Range						Cutter Type
			P	M	K	N (K)	S (M)	H (P/K)	
	AOMT160516R	double-edged, positive geometry with R1,6	+	+	+	○	○		EA16D10, IA16D10, IA16M01, SA16D03, SA16M01
	AOMT160524R	double-edged, positive geometry with R2,4	+	+	+	○	○		EA16D10, IA16D10, IA16M01, SA16D03, SA16M01
	AOMT160532R	double-edged, positive geometry with R3,2	+	+	+	○	○		EA16D10, IA16D10, IA16M01, SA16D03, SA16M01
	AOMT160540R	double-edged, positive geometry with R4,0	+	+	+	○	○		EA16D10, IA16D10, IA16M01, SA16D03, SA16M01
	AOMT160550R	double-edged, positive geometry with R5,0	+	+	+	○	○		EA16D10, IA16D10, IA16M01, SA16D03, SA16M01
	AOMT160564R	double-edged, positive geometry with R6,4	+	+	+	○	○		EA16D10, IA16D10, IA16M01, SA16D03, SA16M01
	APCT080304FR	double-edged, positive and sharp-edged geometry for non-ferrous materials with R0,4				+			EA08D10, EA08D10A, IA08D03, IA08M01, SA08D03, SA08E01, SA08M01
	APCT080304FR-P	double-edged, positive, polished and sharp-edged geometry for non-ferrous materials with R0,4				+			EA08D10, EA08D10A, IA08D03, IA08M01, SA08D03, SA08E01, SA08M01
	APKT080304R	double-edged, positive geometry with R4,0	+	+	+	○	○	○	EA08D10, EA08D10A, IA08D03, IA08M01, SA08D03, SA08E01, SA08M01
	APKT080304R-DT1	single-edged, positive insert with short PCD-tip				+			EA08D10. EA08D10A, SA08D03, SA08E01, SA08M01
	APKT080304R-DT2	single-edged, positive insert with long PCD-tip				+			EA08D10. EA08D10A, SA08D03, SA08E01, SA08M01
	BCCT130404FR	double-edged, positive and sharp-edged geometry for non-ferrous materials with R0,4				+			EB13D10, FB13D03, FB13D10, IB13D03, IB13D10, IB13M01, SB13D03, SB13M01
	BCCT130404FR-P	double-edged, positive, polished and sharp-edged geometry for non-ferrous materials with R0,4				+			EB13D10, FB13D03, FB13D10, IB13D03, IB13D10, IB13M01, SB13D03, SB13M01
	BCKT130402R-DT1	single-edged, positive insert with short PCD-tip				+			EB13D10, SB13D03, SB13M01

+ Preferred choice ○ Second choice

Subject to technical changes

SURVEY OF INDEXABLE INSERTS WITHIN THEIR APPLICATION RANGE

	Designation	Insert Option	Application Range						Cutter Type
			P	M	K	N (K)	S (M)	H (P/K)	
	BCKT130402R-DT2	single-edged, positive insert with long PCD tip				+			EB13D10, SB13D03, SB13M01
	BCKT130404R	double-edged, positive geometry with R0,4	+	+	+	○	○		EB13D10, FB13D03, FB13D10, IB13D03, IB13D10, IB13M01, SB13D03, SB13M01
	BCKT130410R	double-edged, positive geometry with R1,0	+	+	+	○	○		EB13D10, FB13D03, FB13D10, IB13D03, IB13D10, IB13M01, SB13D03, SB13M01
	BCKT130415R	double-edged, positive geometry with R1,5	+	+	+	○	○		EB13D10, FB13D03, FB13D10, IB13D03, IB13D10, IB13M01, SB13D03, SB13M01
	BCKT130420R	double-edged, positive geometry with R2,0	+	+	+	○	○		EB13D10, FB13D03, FB13D10, IB13D03, IB13D10, IB13M01, SB13D03, SB13M01
	CDE313L021	double-edged, positive, rhombic	+	+	+	○	○		BCE01A
	CDE313L021-J	double-edged, positive, rhombic	+	○	○				BCE01A
	CDE313L021T00	double-edged, positive geometry with K-Land		○			+		BCE01A
	CDE322L005	double-edged, positive, rhombic	+	+	+	○	○		BCD10A
	CDE322L005-J	double-edged, positive, rhombic	+	○	○				BCD10A
	CDE322L005T00	double-edged, positive geometry with K-Land		○			+		BCD10A
	CNHU060310N	four-edged, positive geometry with R1,0	+	+	+	○	○	○	KC06E01
	CNHU110420N	four-edged, positive geometry with R2,0	+	+	+	○	○	○	KC11D10, KC11E01
	DND324L103-J	four-edged (R+L), neutral geometry with K-Land for plunge milling	+						BDD10A

+ Preferred choice ○ Second choice

Subject to technical changes

SURVEY OF INDEXABLE INSERTS WITHIN THEIR APPLICATION RANGE

	Designation	Insert Option	Application Range						Cutter Type
			P	M	K	$N_{(K)}$	$S_{(M)}$	$H_{(P/K)}$	
	DND324L104T34-J	four-edged (R+L), neutral geometry with K-Land for plunge milling	+						BDD10A
	DPD324L123-A	four-edged (R+L), positive geometry with K-Land for plunge milling	+	+	+	+			BDD10A
	DPD324L124-A	four-edged (R+L), positive geometry with K-Land for plunge milling	+	+	+	+			BDD10A
	GCXF071601N	single-edged, positive geometry	+	○	+				DFD01
	GCXF082202N	single-edged, positive geometry	+	○	+				DFD01
	GCXF092402N	single-edged, positive geometry	+	○	+				DFD01A
	GCXF113102N	single-edged, positive geometry	+	○	+				DFD01A
	GCXF114103N	single-edged, positive geometry	+	○	+				DFD01A
	NCET0802MOR	single-edged, positive geometry	+	+	○	+			KWD02, KWD03, KWE01
	NCET1002MOR	single-edged, positive geometry	+	+	○	+			KWD02, KWD03, KWE01
	NCEX1203MOR	single-edged, positive geometry	+	+	○	+			KWD02, KWD03, KWE01
	NCEX1605MOR	single-edged, positive geometry	+	+	○	+			KWD02, KWD03, KWE01
	NCEX2005MOR	single-edged, positive geometry	+	+	○	+			KWD02, KWD03, KWE01
	NCEX2506MOR	single-edged, positive geometry	+	+	○	+			KWD02, KWD03, KWE01

+ Preferred choice ○ Second choice

Subject to technical changes

SURVEY OF INDEXABLE INSERTS WITHIN THEIR APPLICATION RANGE

	Designation	Insert Option	Application Range						Cutter Type
			P	M	K	N (K)	S (M)	H (P/K)	
	NPHG1003MOR	single-edged, positive geometry with R5	+	+	+	○	○	+	KND02A, KND02B, KNE01
	NPHG1204MOR	single-edged, positive geometry with R6	+	+	+	○	○	+	KND02A, KND02B, KNE01
	NPHG1604MOR	single-edged, positive geometry with R8	+	+	+	○	○	+	KND02A, KND02B, KNE01
	NPHG2004MOR	single-edged, positive geometry with R10	+	+	+	○	○	+	KND02A, KND02B, KNE01
	NPHG2506MOR	single-edged, positive geometry with R12,5	+	+	+	○	○	+	KND02A, KND02B, KNE01
	NPHG3007MOR	single-edged, positive geometry with R15	+	+	+	○	○	+	KND02A, KNE01
	OFCT05T3AFFN-P	eight-edged (R+L), positive, polished and sharp-edged geometry for non-ferrous materials with R0,8				+			P005D10, P005E01
	OFCT05T3TN	eight-edged, positive geometry with reinforced cutting edge		+					P005D10, P005E01
	OFCT0705AFFN-P	eight-edged, positive, polished and sharp-edged geometry for non-ferrous materials				+			P007D10
	OFCT0705AFFR-W	four-edged wiper finishing inserts	+	○	○				P007D10
	OFMT05T3AFN-HR	eight-edged, positive geometry	+	+	+	○	○	○	P005D10, P005E01
	OFMT0705AFR-HR	eight-edged, positive geometry	+	○	+				P007D10
	OFMT0705AFTN	eight-edged, positive geometry with reinforced cutting edge	+	○	+				P007D10
	OFMW05T3AFTN	eight-edged, neutral geometry with K-Land for heavy-duty cuts	+	○	+				P005D10, P005E01

+ Preferred choice ○ Second choice

Subject to technical changes

SURVEY OF INDEXABLE INSERTS WITHIN THEIR APPLICATION RANGE

	Designation	Insert Option	Application Range						Cutter Type
			P	M	K	N (K)	S (M)	H (P/K)	
	OFMW0705AFTN	eight-edged, neutral geometry with K-Land for heavy-duty cuts	+	○	+				P007D10
	PNCQ0804ZNTN	ten-edged,neutral geometry with K-Land for high feed application	+	○	+			○	KP08D10, KP08E01
	PNCU0805GNFR-P	ten-edged, positive, polished and sharp-edged geometry for non-ferrous materials				+	○		PP08D10A, PP08D10B
	PNCU0805GNR	ten-edged, positive geometry SiN			+				PP08D10A, PP08D10B
	PNCU0805GNTR	ten-edged, positive geometry	+	+	+	○			PP08D10A, PP08D10B
	PNCU0805GNTR-W	double-edged rough-finish-geometry	+	+	+	○			PP08D10A, PP08D10B
	RCLT1606MON-CC	four-edged, positive steel geometry	+	○	+				PR16D10CC, PR16E01CC
	RCLT1606MON-CC1	four-edged, positive steel geometry	+	+	+				PR16D10CC, PR16E01CC
	RCLT1606MON-CP	four-edged, positive aluminum geometry				+			PR16D10CC, PR16E01CC
	RCLT1606MOTN-PH	min. four-edged, positive steel geometry	+	+	+				PR16D10CC, PR16E01CC
	RHHT0802MOFN-P	min. four-edged, positive, sharp-edged and polished geometry				+			PR08D03/PR10D03N, PR08E01N/PR10E01N, PR08E01P/PR10E01P
	RHHT0802MOTN	min. four-edged, positive geometry with K-Land	+	+	+	+	○		PR08D03/PR10D03N, PR08E01N/PR10E01N, PR08E01P/PR10E01P
	RHHT0802MOTN-P	min. four-edged, titanium geometry, polished		+			+		PR08D03/PR10D03N, PR08E01N/PR10E01N, PR08E01P/PR10E01P
	RHHT1003MOFN-P	min. four-edged, positive, sharp-edged and polished geometry for non-ferrous materials				+			PR08D03/PR10D03N, PR08E01N/PR10E01N, PR08E01P/PR10E01P, PR10D10N, PR10D10P

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SURVEY OF INDEXABLE INSERTS WITHIN THEIR APPLICATION RANGE

	Designation	Insert Option	Application Range						Cutter Type
			P	M	K	N (K)	S (M)	H (P/K)	
	RHHT1003MOTN	min. four-edged, positive geometry with K-Land	+	+	+	+	○		PR08D03/PR10D03N, PR08E01N/PR10E01N, PR08E01P/PR10E01P, PR10D10N, PR10D10P
	RHHT1003MOTN-P	min. four-edged, titanium geometry, polished		+			+		PR08D03/PR10D03N, PR08E01N/PR10E01N, PR08E01P/PR10E01P, PR10D10N, PR10D10P
	RHHT1204MOFN-P	min. four-edged, positive, sharp-edged and polished geometry for non-ferrous materials				+			PR12D10N, PR12D10P, PR12E01N, PR12E01P
	RHHT1204MOTN	min. four-edged, positive geometry with K-Land	+	+	+	+	○		PR12D10N, PR12D10P, PR12E01N, PR12E01P
	RHHT1204MOTN-P	min. four-edged, titanium geometry, polished		+			+		PR12D10N, PR12D10P, PR12E01N, PR12E01P
	RHHT1605MOFN-P	min. four-edged, positive, sharp-edged and polished geometry for non-ferrous materials				+			PR16D10N, PR16D10P/PR20D10P, PR16E01N/PR16E01P
	RHHT1605MOTN	min. four-edged, positive, geometry with K-Land	+	+	+	+	○		PR16D10N, PR16D10P/PR20D10P, PR16E01N/PR16E01P
	RHHT1605MOTN-P	min. four-edged, positive and polished geometry for titanium		+			+		PR16D10N, PR16D10P/PR20D10P, PR16E01N/PR16E01P
	RHHW0602MOTN	min. four-edged, neutral geometry with K-Land	+	+	+			+	PR06D03N, PR06E01N
	RHHW0802MOTN	min. four-edged, neutral geometry with K-Land	+	+	+			+	PR08D03/PR10D03N, PR08E01N/PR10E01N, PR08E01P/PR10E01P
	RHHW1003MOTN	min. four-edged, neutral geometry with K-Land	+	+	+			+	PR08D03/PR10D03N, PR08E01N/PR10E01N, PR08E01P/PR10E01P, PR10D10N, PR10D10P
	RHHW1003MOTN - J	min. four-edged, neutral geometry with K-Land	+	+	+				PR08D03/PR10D03N, PR08E01N/PR10E01N, PR08E01P/PR10E01P, PR10D10N, PR10D10P
	RHHW1204MOTN	min. four-edged, neutral geometry with K-Land	+	+	+			+	PR12D10N, PR12D10P, PR12E01N, PR12E01P
	RHHW1204MOTN - J	min. four-edged, neutral geometry with K-Land	+	+	+				PR12D10N, PR12D10P, PR12E01N, PR12E01P

+ Preferred choice ○ Second choice

Subject to technical changes

SURVEY OF INDEXABLE INSERTS WITHIN THEIR APPLICATION RANGE

	Designation	Insert Option	Application Range						Cutter Type
			P	M	K	N (K)	S (M)	H (P/K)	
	RHHW1605MOTN	min. four-edged, neutral geometry with K-Land	+	+	+			+	PR16D10N, PR16D10P/PR20D10P, PR16E01N, PR16E01P
	RHHW1605MOTN - J	min. four-edged, neutral geometry with K-Land	+	+	+				PR16D10N, PR16D10P/PR20D10P, PR16E01N, PR16E01P
	RHKT1605MOTN-PH	min. four-edged, positive geometry with K-Land	+	+	+		+		PR16D10N, PR16D10P/PR20D10P, PR16E01N, PR16E01P
	RHKT2006MOTN-PH	min. four-edged, positive geometry with K-Land	+	+	+		+		PR16D10P/PR20D10P
	RHKW1003MOTN	min. four-edged, neutral geometry with K-land for roughing	+	+	+				PR08E01N/PR10E01N, PR08E01P/PR10E01P, PR10D10N, PR10D10P
	RHKW1003MOTN - J	min. four-edged, neutral geometry with K-land for roughing	+	+	+				PR08D03/PR10D03N, PR08E01N/PR10E01N, PR08E01P/PR10E01P, PR10D10N, PR10D10P
	RHKW1204MOTN	min. four-edged, neutral geometry with K-land for roughing	+	+	+				PR12D10N, PR12D10P, PR12E01N, PR12E01P
	RHKW1204MOTN - J	min. four-edged, neutral geometry with K-land for roughing	+	+	+				PR12D10N, PR12D10P, PR12E01N, PR12E01P
	RHKW1605MOTN	min. four-edged, neutral geometry, with K-land for roughing	+	+	+				PR16D10N, PR16D10P/PR20D10P, PR16E01N, PR16E01P
	RHKW1605MOTN - J	min. four-edged, neutral geometry, with K-land for roughing	+	+	+				PR16D10N, PR16D10P/PR20D10P, PR16E01N, PR16E01P
	RHKW2006MOTN	min. four-edged, neutral geometry, with K-land for roughing	+	+	+				PR16D10P/PR20D10P
	RHKW2006MOTN - J	min. four-edged, neutral geometry, with K-land for roughing	+	+	+				PR16D10P/PR20D10P
	SCLT050204N-PH	four-edged, positive geometry	+	+	+	○	+		2D Ø 13 - Ø 29, 4D Ø 13 - Ø 29, BSD03B
	SDCT080305FN	four-edged, positive and sharp-edged geometry for non-ferrous materials				+			DS08D01, DS08D10, ES08D10, FS08D03, FS08E01, IS08D03, IS08D10, IS08M01, SS08D03, SS08M01, TS08D03, TS08M01

+ Preferred choice ○ Second choice

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			P	M	K	N (K)	S (M)	H (P/K)	
	SDCT080305FN-P	four-edged, positive, sharp-edged and polished geometry for non-ferrous materials				+			DS08D01, DS08D10, ES08D10, FS08D03, FS08E01, IS08D03, IS08D10, IS08M01, SS08D03, SS08M01, TS08D03, TS08M01
	SDE-31-001 - J	four-edged, positive geometry with K-land	+	+	+	○			DTD01, DTD10
	SDE-31-002 - J	four-edged, positive geometry with K-land	+	+	+	○			DTD01, DTD10
	SDE-42-001 - J	four-edged, positive geometry with K-land	+	+	+	○			DTD01, DTD10
	SDE-42-002 - J	four-edged, positive geometry with K-land	+	+	+	○			DTD01, DTD10
	SDE-42-003 - J	four-edged, positive geometry with K-land	+	+	+	○			DTD01, DTD10
	SDE-43-001 - J	four-edged, positive geometry with K-land	+	+	+	○			DTD01, DTD10
	SDGT07T308-HP	four-edged, positive and sharp-edged geometry for non-ferrous materials with R0,8				+			2D Ø 13 - Ø 29 4D Ø 13 - Ø 29 5D Ø 16 - Ø 27, BSD03A, BSE01B 93,2°, BSE01C 90°
	SDGT140512-HP	four-edged, positive and sharp-edged geometry for non-ferrous materials with R1,2				+			2D Ø 30 - Ø 50 3D Ø 28 - Ø 50 4D Ø 30 - Ø 50 BSD03A, BSD03B, BSE01A
	SDMT080305N	four-edged and positive geometry	+	+	+	○	○		DS08D01, DS08D10, ES08D10, FS08D03, FS08E01, IS08D03, IS08D10, IS08M01, SS08D03, SS08M01, TS08D03, TS08M01
	SDMT120608FR	four-edged, positive titanium geometry with R0,8		+			+		ES12D10, IS12D10, IS12M01
	SDMT120608R	four-edged and positive geometry	+	+	+		○		ES12D10, IS12D10, IS12M01
	SDMW080305TN	four-edged, neutral geometry for K-land and heavy-duty cuts	+	○	+				DS08D01, DS08D10, ES08D10, FS08D03, FS08E01, IS08D03, IS08D10, IS08M01, SS08D03, SS08M01, TS08D03, TS08M01
	SDMW080305TN-W	four-edged rough-finish geometry	+	○	+				ES08D10

+ Preferred choice ○ Second choice

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			P	M	K	N (K)	S (M)	H (P/K)	
	SECT09T3AFFN	four-edged, positive and sharp-edged geometry for non-ferrous materials				+			PS09D03, PS09D10
	SECT09T3AFFN-P	four-edged, positive, polished and sharp-edged geometry for non-ferrous materials				+			PS09D03, PS09D10
	SEE-31-101	four-edged geometry for non-ferrous materials				+			DTD01, DTD10
	SEE-31-102	four-edged geometry for non-ferrous materials				+			DTD01, DTD10
	SEE-42-101	four-edged geometry for non-ferrous materials				+			DTD01, DTD10
	SEE-42-102	four-edged geometry for non-ferrous materials				+			DTD01, DTD10
	SEE-42-103	four-edged geometry for non-ferrous materials				+			DTD01, DTD10
	SEE-43-101	four-edged geometry for non-ferrous materials				+			DTD01, DTD10
	SEKT09T3AFN	four-edged, positive geometry	+	+	+	○	○		PS09D03, PS09D10
	SHET110502FR-P	four-edged, positive, polished and sharp-edged geometry for non-ferrous materials with R0,2				+			ES11D10, SS11E01
	SHET110505FR-P	four-edged, positive, polished and sharp-edged geometry for non-ferrous materials with R0,5				+			ES11D10, SS11E01
	SHET110508FR-P	four-edged, positive, polished and sharp-edged geometry for non-ferrous materials with R0,8				+			ES11D10, SS11E01
	SHET110516FR-P	four-edged, positive, polished and sharp-edged geometry for non-ferrous materials with R1,6				+			ES11D10, SS11E01
	SHET110524FN-P	four-edged, positive, polished and sharp-edged geometry for non-ferrous materials with R2,4				+			ES11D10, SS11E01

+ Preferred choice ○ Second choice

Subject to technical changes

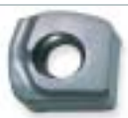
SURVEY OF INDEXABLE INSERTS WITHIN THEIR APPLICATION RANGE

	Designation	Insert Option	Application Range						Cutter Type
			P	M	K	N (K)	S (M)	H (P/K)	
	SHET110532FN-P	four-edged, positive, polished and sharp-edged geometry for non-ferrous materials with R3,2				+			ES11D10, SS11E01
	SHET110540FN-P	four-edged, positive, polished and sharp-edged geometry for non-ferrous materials with R4				+			ES11D10, SS11E01
	SHGT050204-HP	four-edged, positive, sharp-edged geometry for non-ferrous materials with R0,4				+			2D Ø 13 - Ø 29 4D Ø 13 - Ø 29 BSD03B
	SHGT060204-HP	four-edged, positive, sharp-edged geometry for non-ferrous materials with R0,4				+			2D Ø 13 - Ø 29, 4D Ø 13 - Ø 29, 5D Ø 16 - Ø 27, BSD03A, BSD03B, BSE01A, BSE01B 93,2°, BSE01C 90°
	SHGT090408-HP	four-edged, positive, sharp-edged geometry for non-ferrous materials with R0,8				+			2D Ø 13 - Ø 29, 2D Ø 30 - Ø 50, 4D Ø 13 - Ø 29, 3D Ø 28 - Ø 50, 4D Ø 30 - Ø 50, BSD03A, BSD03B, BSE01A, BSE01B 93,2°, BSE01C 90°
	SHGT110408-HP	four-edged, positive, sharp-edged geometry for non-ferrous materials with R0,8				+			2D Ø 30 - Ø 50 3D Ø 28 - Ø 50 4D Ø 30 - Ø 50 BSD03B, BSE01A
	SHLT060204N-PH	four-edged, positive geometry with R0,4	+	+	+	○	+		2D Ø 13 - Ø 29, 4D Ø 13 - Ø 29 , 5D Ø 16 - Ø 27, BSD03A, BSD03B, BSE01A, BSE01B 93,2°, BSE01C 90°
	SHLT090408N-PH1	four-edged, positive geometry with R0,8	+	+	+	○	+		2D Ø 13 - Ø 29, 2D Ø 30 - Ø 50, 4D Ø 13 - Ø 29, 3D Ø 28 - Ø 50, 4D Ø 30 - Ø 50, BSD03A, BSD03B, BSE01A, BSE01B 93,2°, BSE01C 90°
	SHLT110408N-PH1	four-edged, positive geometry with R0,8	+	+	+	○	+		2D Ø 30 - Ø 50 3D Ø 28 - Ø 50 4D Ø 30 - Ø 50 BSD03B, BSE01A
	SHLT140508TN-HR	four-edged, positive geometry	+	+	+				ES14D10, IS14D10, PS14D10
	SHLT140508TN-HS	four-edged, positive geometry, for non-ferrous materials				+	○		ES14D10, IS14D10, PS14D10
	SHLT1405APTN-HR	four-edged, positive geometry, with wiper	+	+	+				PS14D10
	SHLT1405APTN-HR-A	four-edged, positive geometry, with wiper	+		+				PS14D10
	SPLT07T308N-PH	four-edged, positive geometry with R0,8	+	+	+	○	+		2D Ø 13 - Ø 29 4D Ø 13 - Ø 29 5D Ø 16 - Ø 27, BSD03A, BSE01B 93,2°, BSE01C 90°

+ Preferred choice ○ Second choice

Subject to technical changes

SURVEY OF INDEXABLE INSERTS WITHIN THEIR APPLICATION RANGE

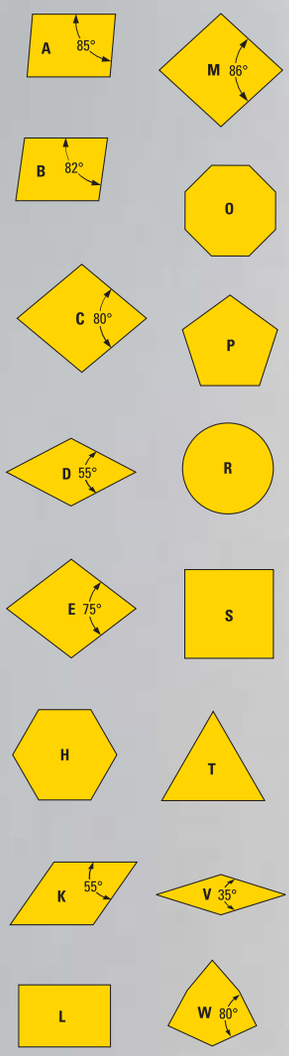
	Designation	Insert Option	Application Range						Cutter Type
			P	M	K	N (K)	S (M)	H (P/K)	
	SPLT140512N-PH	four-edged, positive geometry with R1,2	+	+	+	○	+		2D Ø 30 - Ø 50 3D Ø 28 - Ø 50 4D Ø 30 - Ø 50 BSD03A, BSD03B, BSE01A
	UHLD08T310R-M	double-edged, positive geometry	+	+	+		+		KU08D10, KU08E01
	UHLD08T310R-MR	double-edged, neutral geometry	+	+	+		+		KU08D10, KU08E01
	UHLD130515R-M	double-edged, positive geometry	+	+	+		+		KU13D10, KU13E01
	UHLD130515R-MR	double-edged, neutral geometry	+	+	+		+		KU13D10, KU13E01
	XEET250408R-P	double-edged, positive, sharp-edged and polished geometry for non-ferrous materials with R0,8				+			EX25D10, EX25E01
	XEET250408R-PWRWK	double-edged wiper facette for non-ferrous materials with R0,8				+			EX25D10, EX25E01
	XEET250432R-P	double-edged, positive, sharp-edged and polished geometry for non-ferrous materials with R3,2				+			EX25D10, EX25E01
	YDA322L101	double-edged, rhombic, wiper finishing - insert	+	+	+	+	○		PY D10

+ Preferred choice ○ Second choice

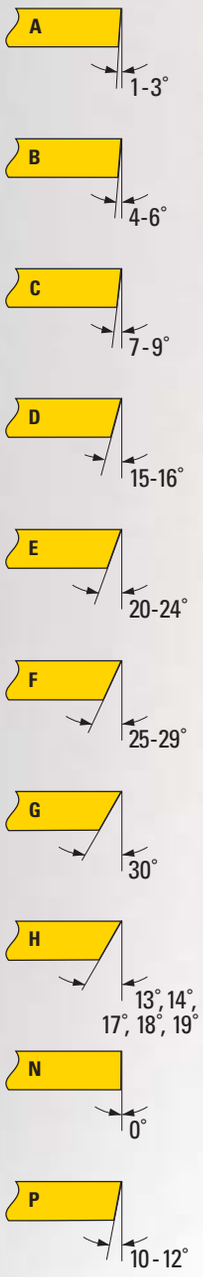
Subject to technical changes

A 1 P 2 C 3 T 4

1 INSERT SHAPE

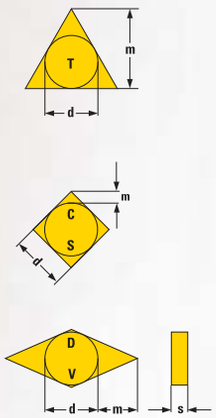


2 CLEARANCE ANGLE



o = others

3 TOLERANCES



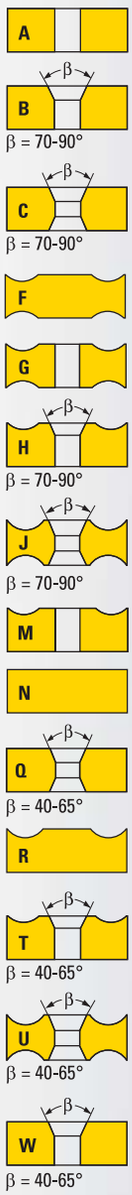
Tolerance in mm

	d	m	s
A	± 0,025	± 0,005	± 0,025
C	± 0,025	± 0,013	± 0,025
E	± 0,025	± 0,025	± 0,025
F	± 0,013	± 0,005	± 0,025
G	± 0,025	± 0,025	± 0,05-0,13
H	± 0,013	± 0,013	± 0,025
J[1]	± 0,05-0,15[2]	± 0,005	± 0,025
K[1]	± 0,05-0,15[2]	± 0,013	± 0,025
L[1]	± 0,05-0,15[2]	± 0,013	± 0,025
M	± 0,05-0,15[2]	± 0,08-0,20[2]	± 0,013
N	± 0,05-0,15[2]	± 0,08-0,20[2]	± 0,025
U	± 0,05-0,25[2]	± 0,13-0,38[2]	± 0,05-0,13

[1] Inserts with ground wipers

[2] depending on insert size (see ISO-standard 1832)

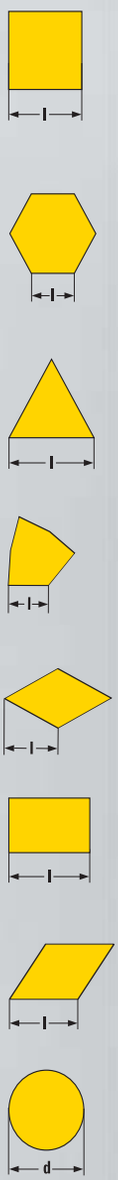
4 INSERT TYPE



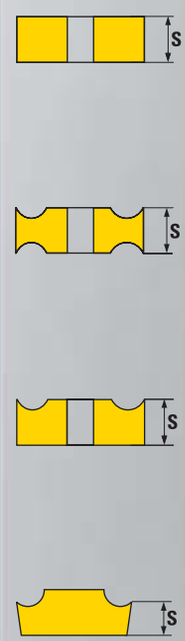
X
Special design (description required)

08	03	04	F	R	–	P
5	6	7	8	9		10

5 LENGTH OF CUTTING EDGE

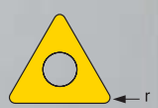


6 INSERT THICKNESS



01 s = 1,59
T1 s = 1,98
02 s = 2,38
T2 s = 2,78
03 s = 3,18
T3 s = 3,97
04 s = 4,76
05 s = 5,56
06 s = 6,35
07 s = 7,94
09 s = 9,52

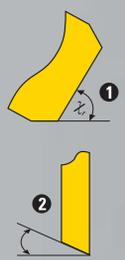
7 CORNER RADIUS



02 r = 0,2
04 r = 0,4
08 r = 0,8
12 r = 1,2
16 r = 1,6
24 r = 2,4

R

00 for dia.
with inch measures
converted to mm.
MO for dia.
in metric measures.



❶ Lead angle χ_r
A = 45°
D = 60°
E = 45°
F = 45°
P = 45°
Z = for other angles

❷ Clearance angle on wiper
A = 3°
B = 5°
C = 7°
D = 15°
E = 20°
F = 25°
G = 30°
N = 0°
P = 11°
Z = for other angles

8 CUTTING EDGE CONDITION

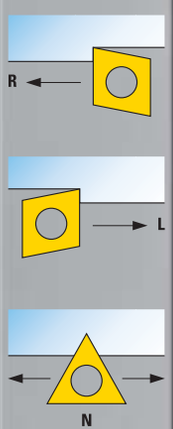
E rounded

F sharp-edged

T with K-land

S with K-land & rounded

9 CUTTING DIRECTION



10 INTERNAL DESIGNATIONS

for example:

P = polished

W = with wiper finishing edge/facette

Subject to technical changes

CUTTING MATERIALS – COATINGS

UNCOATED CARBIDES

IN04S	K10–K20	Micro-grain carbide grade for machining aluminum with a higher silicon content also at higher cutting speed rates as well as for light- and medium-duty machining of grey cast iron.
IN05S	M10–M20	Micro-grain carbide grade, well suitable for machining titanium and super alloys of the ISO material group S. Also applied successfully for non-ferrous metals as well as for light-duty milling in grey cast iron.
IN10K	K10–K25	Wear resistant grade for roughing and finishing cast iron, aluminum alloys, non-ferrous metals as well as plastics. To be applied with lower tooth load at higher cutting speed rates.
IN15K	K20–K40	Universal grade for machining grey cast iron materials, aluminum alloys and various non-ferrous materials. Preferably applied for medium-range cutting data.
IN30M	M20–M40 K20–K50	Very resistant to chipping and break-outs. This grade is applied for machining non-ferrous metals as well as cast iron materials.

COATED CARBIDES

IN0545	P30–P50	Special PVD-coated grade for circular interpolation milling. Strong cutting edges provide excellent tool live when machining steel, stainless steels and cast iron materials.
IN1030	P20–P40 M20–M40 K15–K30	Universal grade for all steels, wet milling of stainless steel at medium cutting speed rate. Very tough and resistant to chipping.
IN2004	P10–P20 K10–K25	PVD-coated high-performance multi-range grade, combining high wear resistance with high toughness for milling alloyed steels as well as cast iron materials – especially CGI. Applied for medium up to higher cutting speed rates, for finish up to medium rough milling under mainly stable application conditions.
IN2005	M15–M35 K20–K40	Coated micro-grain carbide grade with good toughness and excellent wear resistance for machining steels with increased tenacity, stainless steels as well as grey cast iron and nodular cast iron.
NEW! **IN2006**	P05–P20 M10–M20	Coated micro-grain carbide grain with good toughness and excellent wear resistance for machining hardened steels up to 62 HRC.
IN2010	K10–K25	TiAlN-coated grade with good wear resistance for machining grey cast iron materials at medium up to increased cutting speed rates. This grade is especially suitable when positive cutting geometries are applied under unfavorable cutting conditions.
IN2015	P20–P35 K20–K40 M20–M40	TiAlN-coated multi-range grade, combining excellent wear resistance with good toughness for machining grey cast iron, nodular cast iron and steels with higher tenacity as well as austenitic steel. Applied at medium cutting speed rates and tooth loads.
IN2030	P20–P40 M20–M40 K20–K40	TiAlN-coated grade, combining good wear resistance with high toughness for machining steel, stainless and austenitic steel, high-temperature alloys as well as grey cast iron materials at medium up to increased cutting speed rates.

CUTTING MATERIALS – COATINGS

NEW!	**IN2035**	P20–P40 M20–M40 K20–K40	TiAlN-coated grade, combining good wear resistance with high toughness, especially for machining titanium and super alloys of the ISO material group S.
	IN2040	P20–P40	TiAlN-coated grade with excellent wear resistance and a broad application range in machining steel. Especially suitable for dry-milling unalloyed steels and tempering steel at medium up to high cutting speed rates.
	IN6510	K10–K20	MT-CVD-coated carbide with excellent wear resistance and toughness for milling cast iron materials like grey cast iron and nodular cast iron, at small and medium chip cross-sections and medium up to high cutting speed rates.
	IN6515	K20–K40	MT-CVD-coated carbide combining excellent wear resistance with high toughness for machining at medium up to high cutting speed rates and medium-sized chip cross-sections. Well suitable for machining cast iron materials like grey cast iron and nodular cast iron, also under unfavorable cutting conditions.
NEW!	**IN6520**	P10–P35 M10–M35 K10–K30	MT-CVD-coated grade, combining good wear resistance with high toughness for drilling steel, stainless and austenitic steel, HSS, high-temperature alloys as well as grey cast iron materials at medium up to high cutting speed rates. This grade is applied for wear problems on the peripheral insert.
	IN6530	P25–P45 M25–M40 K20–K50	Multilayer MT-CVD-coated grade, combining good wear resistance with high toughness for milling steel, stainless and austenitic steel, HSS, high-temperature alloys as well as grey cast iron materials at lower to medium speed rates. Especially suitable for milling operations on unalloyed steels at medium up to heavy-duty machining.
NEW!	**INDD15**	K20–K40	Multilayer MT-CVD plus PVD-coated carbide, combining excellent wear resistance and toughness for milling at medium up to high cutting speed rates. Recommended for milling cast iron materials like grey cast iron and nodular grey cast iron.

CERMET

IN60C	P10–P30	Cermet grade with high wear resistance at high cutting speed rates. Built-up edge resistance. Semi-finish milling.
IN0560	P05–P15 M05–M15	Coated cermet grade for finish milling steel at high cutting speed rates. Recommended for machining stainless and austenitic steels.

SiN

IN70N	K10–K20	Silicon-nitride (ceramic) cutting material for machining - grey cast iron materials at extremely high cutting speed rates.

PCD

IN90D	K01–K10 K01–K15	Polycrystalline diamond (PCD) for machining aluminum, plastics and graphite.

NewGen

IN2005 / IN2015 / IN2030 / IN2035
Newly developed, high wear resistant PVD-coating TiAlN "Plus" with high hot hardness and oxidation resistance. Ideal for machining grey cast iron and nodular grey cast iron as well as for materials of the ISO material groups S and M.

IN6515
Newly developed MT-CVD Alpha-Al_2O_3-coating for higher cutting speed rates and longer tool lives for machining grey cast iron and nodular grey cast iron.

INDD15
Newly developed, high wear resistant multilayer coating. A combination of MT-CVD plus PVD for highest process security and productivity.

Subject to technical changes

CUTTING MATERIALS – COATINGS

	New Grade	Old Grade	Main ISO group	Coating	Workpiece Material	Grade Characteristics*				Remark
						Mech. Shock	Thermal Shock	Wear Resist.	Crater Resist.	
Coated	IIN04S		K10-K20		Grey cast iron, aluminum, non- ferrous alloys	G	N	EH	M	Sub-micron
	IN05S	ICU206	M10-M20		Titanium, high-alloyed steels	H	M	H	M	Sub-micron
	IN10K	ICU201 ICU202	K10-K25		Grey cast iron, nodular grey cast iron, non- ferrous alloys, aluminum	N	N	H	G	
	IN15K	ICU203 ICU205	K20-K40		Grey cast iron, nodular grey cast iron, non- ferrous alloys aluminum	H	N	M	G	
	IN30M	T06 ICU205	M20-M40 K20-K50		Grey cast iron, nodular grey cast iron, non- ferrous alloys aluminum	H	M	M	G	
Non-Carbide	IN60C	T40 ICS701	P10-P30		all steels, grey cast iron	G	H	H	EH	Cermet
	IN70N	ICS710	K10-K20		Grey cast iron, nodular grey cast iron	G	G	EH	EH	SiN
	IN90D	ICS740	K01-K10		Aluminum, non-ferrous alloys	G	N	EH	N	PCD

* Degree of resistance to specified types of failure: EH = Extremely Hoch; H = High; M = Moderate; L = Low; VL = Very Low

CUTTING MATERIALS – COATINGS

	New Grade	Old Grade	Main ISO group	Coating	Workpiece Material	Grade Characteristics* Mech. Shock	Thermal Shock	Wear Resist.	Crater Resist.	Remark
PVD / Coated	IN0545	ICC502	P30-P50	TIN	Steel, stainless steel, grey cast iron, nodular grey cast iron	H	H	M-H	M	Universal grade for circular thread milling
	IN0560	ICS701A	P05-P15 M05-M15	TIN	All steels, grey cast iron	G	EH	H	EH	Sub-micron
	IN1030	T16 J05	P20-P40 M20-M40 K15-K30	TiCN	Grey cast iron, nodular grey cast iron, all steels, titanium	H	EH	H	H	
	IN2004	ICC517XL	P10-P20 K10-K25	TiAlN	Grey cast iron, compacted cast iron, nodular grey cast iron, alloyed steels	M-H	H	H	H	Sub-micron
	IN2005	T26 ICC519XL	M15-M35 K20-K40	TiAlN	Grey cast iron, nodular grey cast iron, stainless steel	H	N	H	M	Sub-micron
	IN2006		P05-P20 M10-M20	TiAlN	Steel	G	N	EH	M	Sub-micron
	IN2010	ICC512 ICC512XL	K10-K25	TiAlN	Grey cast iron, nodular grey cast iron	N	N-M	EH	N	
	IN2015	T23 ICC514XL	P20-P35 M20-M40 K20-K40	TiAlN	Grey cast iron, nodular grey cast iron, Steel, high temp alloyed	H	N	H	M	
	IN2030	T22	P20-P40 M20-M40 K20-K40	TiAlN	Grey cast iron, nodular grey cast iron, Steel, stainless and austenitic Steels	H	H	M	M-H	
	IN2035	ICC520XL	P20-P40 M20-M40 K20-K40	TiAlN	Titanium, stainless steel, super alloy	H	H	M	M	
	IN2040	T17/ICC511 ICC511XL	P20-P40	TiAlN	Steel, stainless steel	H	H	H	H-EH	
CVD / Uncoated	IN6510	ICC302	K10-K20	MT-CVD Al_2O_3 + TIN	Grey cast iron, nodular grey cast iron	N	H	EH	M	
	IN6515	ICC307	K20-K40	MT-CVD Al_2O_3 + TIN	Grey cast iron, nodular grey cast iron	M	H	M-H	M	
	IN6520		P10-P35 M10-M35 K10-K30	MT-CVD Al_2O_3 + TIN	Grey cast iron, nodular grey cast iron, steel, stainless and austenitic steels	M	H	M-H	M	
	IN6530	ICC305	P25-P45 M25-M40 K20-K50	MT-CVD Al_2O_3 + TIN	Grey cast iron, nodular grey cast iron, steel, stainless and austenitic steels	H	M-H	M-H	M-H	
	INDD15		K20-K40	MT-CVD Al_2O_3 + TiAlN	Grey cast iron, nodular grey cast iron	M	H	M-H	M	

* Degree of resistance to specified types of failure: EH = Extremely High; H = High; M = Moderate; L = Low; VL = Very Low

Subject to technical changes

EXAMPLE FOR DETERMINATION OF CUTTING DATA

First step: Machining material:
Catalog page: **46 – 50**

For example:
Page 47 —> 1.2379 —> group of chipping 11 / 12

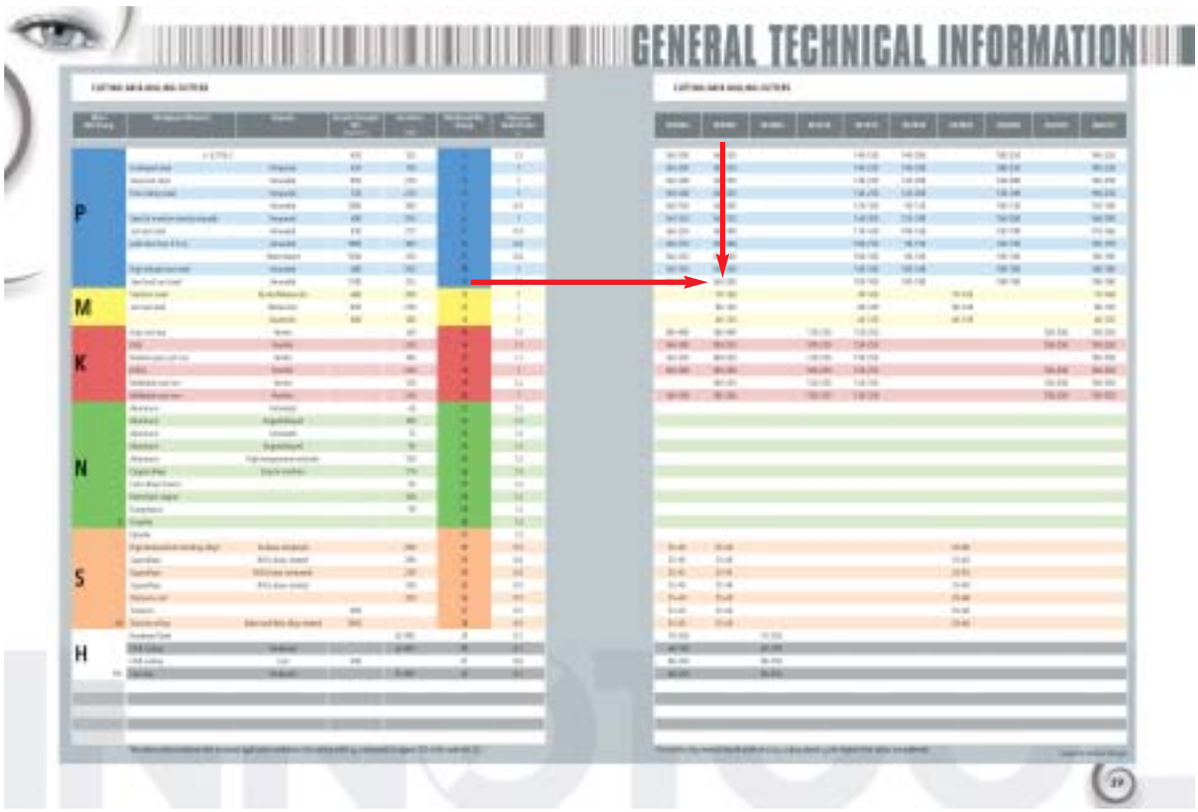
Second step: Determine the adequate carbide grade by means of description:
Catalog page: **20 – 21**

For example:
Page 20 —> IN 2005

EXAMPLE FOR DETERMINATION OF CUTTING DATA

Third step: Adequate cutting speed V_c:
Catalog page: **26 – 33**

For example:
Page 29 —> 160 – 200 m / min. factor of feed 0,8/1



Fourth step: Adequate feed rate per tooth f_z:
Catalog page: 34 – 45

For example:
Page 34 —> square shoulder cutter with AOMT110304R
recommendation of feed: 0,12 – 0,20 mm
calculation of feed:
initial value —> 0,15 x (factor of feed) 0,8 = 0,12 mm

Initial value:
V_c = 140 m/min (quality IN 2005)
f_z = 0,12 mm

CUTTING DATA MILLING CUTTERS

Main ISO Group	Workpiece Material	Workpiece Material	Tensile Strength Rm [N/mm²]	Hardness [HB]	Machinability Group	Feed per Tooth Factor k_f
P	< 0,15% C		420	125	1	1,2
	Unalloyed steel	Tempered	650	190	2	1
	Structural steel	Annealed	850	220	3	1
	Free cutting steel	Tempered	750	250	4	1
		Annealed	1000	300	5	0,9
	Steel of medium tensile strength	Tempered	600	200	6	1
	and cast steel	Annealed	930	275	7	0,9
	(with less than 5 % C)	Annealed	1000	300	8	0,8
		Heat treated	1200	350	9	0,8
	High-alloyed cast steel	Annealed	680	200	10	1
	Steel and tool steel	Annealed	1100	325	11	0,8
M	Stainless steel	Ferritic/Martensitic	680	200	12	1
	and cast steel	Martensitic	820	240	13	1
		Austenitic	600	180	14	1
K	Grey cast iron	Ferritic		160	15	1,2
	(GG)	Pearlitic		250	16	1,1
	Nodular grey cast iron	Ferritic/Pearlitic		180	17	1,1
	(GGG)	Pearlitic		260	18	1
	Malleable cast iron	Ferritic		130	19	1,2
	Malleable cast iron	Pearlitic		230	20	1
N	Aluminum	Untreated		60	21	1,5
	Aluminum	Forged/alloyed		100	22	1,2
	Aluminum	Untreated		75	23	1,3
	Aluminum	Forged/alloyed		90	24	1,3
	Aluminum	High-temperature resistant		130	25	1,2
	Copper alloys	Easy to machine		110	26	1,5
	CuZn-alloys (brass)			90	27	1,2
	Electrolytic copper			100	28	1,2
	Duroplastics			90	29	1,3
K	Graphite				30	1,5
S	Ebonite				31	1,2
	High-temperature resisting alloys	Fe-base, tempered		200	32	0,9
	Superalloys	Ni/Co-base, treated		280	33	0,8
	Superalloys	Ni/Co-base, tempered		250	34	0,9
	Superalloys	Ni/Co-base, treated		350	35	0,9
	Titanium, cast			320	36	0,9
	Titanium		400		37	0,9
M	Titanium alloys	Alpha and Beta alloy, treated	1050		38	0,9
H	Hardened Steel			55 HRC	39	0,7
	Chill casting	Hardened		60 HRC	40	0,7
	Chill casting	Cast	400		41	0,8
P/K	Cast iron	Hardened		55 HRC	42	0,7

The values indicated above refer to normal application conditions (the cutting width a_e corresponds to approx. 2/3 of the cutter dia. D).

CUTTING DATA MILLING CUTTERS

IN 04S	IN 05S	IN 10K	IN 15K	IN 30M	IN 0545	IN 0560	IN 1030		
					70–150	250–400	120–160		
					70–160	250–400	110–140		
					50–130	250–400	120–160		
					50–130	250–400	120–160		
					50–110	250–400	90–130		
					50–140	250–400	120–160		
					50–120	250–400	100–140		
					50–120	250–400	90–130		
					50–120	250–400	80–120		
					50–120	250–400	100–140		
						250–350	90–130		
						150–250	70–90		
						150–250	80–100		
						150–250	70–90		
		100–140	90–130			100–250	120–160		
		90–130	80–110			100–250	120–160		
		100–140	90–120			100–250	120–160		
		90–130	80–110			100–250	120–160		
		100–140	90–130			100–150	120–160		
		100–130	80–110			100–200	120–160		
600–2000	600–2000	600–2000	600–2000	300–2000			160–400		
600–1500	600–1500	600–1500	600–1500	300–1200			160–400		
200–800	200–800	200–800	200–800	200–800			160–400		
200–500	200–500	200–500	200–500	200–600			160–400		
100–400	100–400	100–250	100–250	100–250			160–400		
250–700	250–700	250–350	250–350	250–700					
300–600	300–600	600–800	600–800	300–600					
250–350	250–350	250–350	250–350	250–350					
100–500	100–500	100–500	100–500	100–500					
	70–150		70–150				70–150		
	35–60		35–60				35–60		
	25–30		25–30				25–30		
	25–35		25–35				25–35		
	25–30		25–30				25–30		
	25–60		25–60				25–60		
	25–60		25–60				25–60		
	25–60		25–60				25–60		

For smaller chip removal (small width of cut a_e, cutting depth a_p) the higher chart values are preferred.

Subject to technical changes

CUTTING DATA MILLING CUTTERS

Main ISO Group	Workpiece Material	Remark	Tensile Strength Rm [N/mm²]	Hardness [HB]	Machinability Group	Feed per Tooth Factor k_f
P	< 0,15% C		420	125	1	1,2
	Unalloyed steel	Tempered	650	190	2	1
	Structural steel	Annealed	850	220	3	1
	Free cutting steel	Tempered	750	250	4	1
		Annealed	1000	300	5	0,9
	Steel of medium tensile strength	Tempered	600	200	6	1
	and cast steel	Annealed	930	275	7	0,9
	(with less than 5 % C)	Annealed	1000	300	8	0,8
		Heat treated	1200	350	9	0,8
	High-alloyed cast steel	Annealed	680	200	10	1
	Steel and tool steel	Annealed	1100	325	11	0,8
M	Stainless steel	Ferritic/Martensitic	680	200	12	1
	and cast steel	Martensitic	820	240	13	1
		Austenitic	600	180	14	1
K	Grey cast iron	Ferritic		160	15	1,2
	(GG)	Pearlitic		250	16	1,1
	Nodular grey cast iron	Ferritic		180	17	1,1
	(GGG)	Pearlitic		260	18	1
	Malleable cast iron	Ferritic		130	19	1,2
	Malleable cast iron	Pearlitic		230	20	1
N	Aluminum	Untreated		60	21	1,5
	Aluminum	Forged/alloyed		100	22	1,2
	Aluminum	Untreated		75	23	1,3
	Aluminum	Forged/alloyed		90	24	1,3
	Aluminum	High-temperature resistant		130	25	1,2
	Copper alloys	Easy to machine		110	26	1,5
	CuZn-alloys (brass)			90	27	1,2
	Electrolytic copper			100	28	1,2
	Duroplastics			90	29	1,3
K	Graphite				30	1,5
S	Ebonite				31	1,2
	High-temperature resisting alloys	Fe-base, tempered		200	32	0,9
	Superalloys	Ni/Co-base, treated		280	33	0,8
	Superalloys	Ni/Co-base, tempered		250	34	0,9
	Superalloys	Ni/Co-base, treated		350	35	0,9
	Titanium, cast			320	36	0,9
	Titanium		400		37	0,9
M	Titanium alloys	Alpha and Beta alloy, treated	1050		38	0,9
H	Hardened Steel			55 HRC	39	0,7
	Chill casting	Hardened		60 HRC	40	0,7
	Chill casting	Cast	400		41	0,8
P/K	Cast iron	Hardened		55 HRC	42	0,7

The values indicated above refer to normal application conditions (the cutting width a_e corresponds to approx. 2/3 of the cutter dia. D).

CUTTING DATA MILLING CUTTERS

IN 2004	IN 2005	IN 2006	IN 2010	IN 2015	IN 2030	IN 2035	IN 2040	IN 6510	IN 6515
160–300	160–250			140–230	140–200		180–250		140–230
160–300	160–250			140–230	140–200		180–250		140–230
160–300	160–250			140–230	120–200		140–200		140–230
160–300	160–250			140–230	120–200		130–180		140–230
160–250	160–200			120–180	90–150		100–130		120–180
160–250	160–220			160–200	120–180		160–200		160–200
160–250	160–200			110–160	100–160		120–190		110–160
160–250	160–200			100–190	90–150		100–190		100–190
160–250	160–200			100–180	80–180		100–180		100–180
160–250	160–200			100–180	100–180		100–180		100–180
160–250	160–200			100–180	100–180		100–180		100–180
	70–160			70–160		70–160			70–160
	80–160			80–160		80–160			80–160
	60–120			60–120		60–120			60–120
180–400	180–400		120–250	150–250				150–250	150–250
160–300	180–250		100–230	150–250				150–250	150–250
160–350	180–220		120–250	150–250					150–250
160–300	180–200		100–230	150–250				150–250	150–250
	180–220		120–250	150–250				150–250	150–250
160–200	180–200		100–230	150–220				150–220	150–220
35–60	35–60					35–60			
25–40	25–40					25–40			
25–45	25–45					25–45			
25–40	25–40					25–40			
25–60	25–60					25–60			
25–60	25–60					25–60			
25–60	25–60					25–60			
70–250		70–250							
60–180		60–180							
80–250		80–250							
80–250		80–250							

For smaller chip removal (small width of cut a_e, cutting depth a_p) the higher chart values are preferred.

Subject to technical changes

CUTTING DATA MILLING CUTTERS

Main ISO Group	Workpiece Material	Remark	Tensile Strength Rm [N/mm²]	Hardness [HB]	Machinability Group	Feed per Tooth Factor k_f
P	< 0,15% C		420	125	1	1,2
	Unalloyed steel	Tempered	650	190	2	1
	Structural steel	Annealed	850	220	3	1
	Free cutting steel	Tempered	750	250	4	1
		Annealed	1000	300	5	0,9
	Steel of medium tensile strength	Tempered	600	200	6	1
	and cast steel	Annealed	930	275	7	0,9
	(with less than 5 % C)	Tempered	1000	300	8	0,8
		Heat treated	1200	350	9	0,8
	High-alloyed cast steel	Annealed	680	200	10	1
	Steel and tool steel	Annealed	1100	325	11	0,8
M	Stainless steel	Ferritic/Martensitic	680	200	12	1
	and cast steel	Martensitic	820	240	13	1
		Austenitic	600	180	14	1
K	Grey cast iron	Ferritic		160	15	1,2
	(GG)	Pearlitic		250	16	1,1
	Nodular grey cast iron	Ferritic		180	17	1,1
	(GGG)	Pearlitic		260	18	1
	Malleable cast iron	Ferritic		130	19	1,2
	Malleable cast iron	Pearlitic		230	20	1
N	Aluminum	Untreated		60	21	1,5
	Aluminum	Forged/alloyed		100	22	1,2
	Aluminum	Untreated		75	23	1,3
	Aluminum	Forged/alloyed		90	24	1,3
	Aluminum	High-temperature resistant		130	25	1,2
	Copper alloys	Easy to machine		110	26	1,5
	Electrolytic copper			90	27	1,2
	Electrolytic copper			100	28	1,2
	Duroplastics			90	29	1,3
K	Graphite				30	1,5
S	Ebonite				31	1,2
	High-temperature resisting alloys	Fe-base, tempered		200	32	0,9
	Superalloys	Ni/Co-base, treated		280	33	0,8
	Superalloys	Ni/Co-base, tempered		250	34	0,9
	Superalloys	Ni/Co-base, treated		350	35	0,9
	Titanium, cast			320	36	0,9
	Titanium		400		37	0,9
M	Titanium alloys	Alpha and Beta alloy, treated	1050		38	0,9
H	Hardened Steel			55 HRC	39	0,7
	Chill casting	Hardened		60 HRC	40	0,7
	Chill casting	Cast	400		41	0,8
P/K	Cast iron	Hardened		55 HRC	42	0,7

The values indicated above refer to normal application conditions (the cutting width a_e corresponds to approx. 2/3 of the cutter dia. D).

CUTTING DATA MILLING CUTTERS

IN6520	IN6530	IN60C	IN70N	IN90D	NewGen INDD15				
	140–160	300–600							
	140–160	300–600							
	120–160	200–400							
	120–160	200–400							
	90–130	150–300							
	120–160	200–400							
	100–140	250–300							
	90–130	150–300							
	80–120	120–250							
	100–140	150–300							
	90–130	120–250							
	70–90	150–300							
	80–100	170–340							
	70–90	150–300							
	120–160	300–600	500–1100		150–250				
	120–160	200–400	300–800		150–250				
	120–160	300–600							
	120–160	200–400	400–1000		150–250				
	120–160	300–600	400–1100		150–250				
	120–160	200–400	350–700		150–220				
				800–2000					
				700–2000					
				200–2000					
				200–2000					
				200–2000					
				600–1200					
				600–1200					
				600–1200					
				100–1000					

For smaller chip removal (small width of cut a_e, cutting depth a_p) the higher chart values are preferred.

Subject to technical changes

QUADRILL PLUS CUTTING DATA FOR INDEXABLE DRILLS

Main ISO-group	Workpiece Material	Remark	Tensile Strength Rm [N/mm²]	Hardness [HB]	Machinability Group	Cutting Speed Vc[m/min]
P	< 0,15% C		420	125	1	250 – 300
	Unalloyed steel ≥ 0,25% C	Tempered	650	190	2	250 – 300
	Structural steel < 0,55% C	Annealed	850	220	3	160 – 220
	Free cutting steel ≥ 0,55% C	Tempered	750	250	4	250 – 300
		Annealed	1000	300	5	200 – 250
	Steel of medium tensile strength	Tempered	600	200	6	160 – 220
	and cast steel	Annealed	930	275	7	130 – 200
	(with less than 5 % C)	Annealed	1000	300	8	130 – 180
		Heat treated	1200	350	9	110 – 160
	High-alloyed cast steel	Annealed	680	200	10	120 – 180
	Steel and tool steel	Annealed	1100	325	11	120 – 170
M	Stainless steel	Ferritic/Martensitic	680	200	12	170 – 240
	and cast steel	Martensitic	820	240	13	150– 220
		Austenitic	600	180	14	150 – 220
K	Grey cast iron	Ferritic		160	15	180 – 250
	(GG)	Pearlitic		250	16	180 – 250
	Nodular grey cast iron	Ferritisch/Perlitisch		180	17	160 – 230
	(GGG)	Pearlitic		260	18	160 – 230
	Malleable cast iron	Ferritic		130	19	180 – 250
	Malleable cast iron	Ferritic		230	20	150 – 220
N	Aluminum	Untreated		60	21	400 – 600
	Aluminum	Forged/alloyed		100	22	330 – 380
	Aluminum	Untreated		75	23	400 – 600
	Aluminum	Forged/alloyed		90	24	330 – 380
	Aluminum	High-temperature resistant		130	25	330 – 380
	Copper alloys	Easy to machine		110	26	250 – 300
	CuZn-alloys (brass)			90	27	230 – 280
	Electrolytic copper			100	28	250 – 300
	Duroplastics			90	29	–
K	Graphite				30	–
S	Ebonite				31	–
	High-temperature resisting alloys	Fe-base, tempered		200	32	30 – 70
	Superalloys	Ni/Co-base, treated		280	33	30 – 70
	Superalloys	Ni/Co-base, tempered		250	34	30 – 70
	Superalloys	Ni/Co-base, treated		350	35	30 – 70
	Titanium, cast			320	36	30 – 70
	Titanium		400		37	30 – 70
M	Titanium alloys	Alpha and Beta alloy, treated	1050		38	30 – 60

These data are to be understood as starting values!
By variation of feed rate and feed per tooth the optimum chip shape will be obtained.

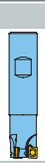
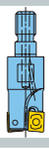
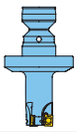
At high cutting speed and low feed rate the generated chips are too long for proper evacuation.
Solution: Reduce cutting speed. If not sufficient, increase feed rate.

At low cutting speed, the generated chips are too short for proper evacuation.
Solution: Increase cutting speed. If not sufficient, reduce feed rate.

QUAD DRILL PLUS CUTTING DATA FOR INDEXABLE DRILLS

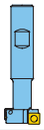
SCLT050204N-PH	SHLT060204N-PH	SPLT07T308N-PH	SHLT090408N-PH1	SHLT110408N-PH1	SPLT140512N-PH
0,05 – 0,10	0,06 – 0,10	0,06 – 0,12	0,07 – 0,13	0,08 – 0,15	0,08 – 0,16
0,05 – 0,10	0,06 – 0,10	0,06 – 0,12	0,07 – 0,13	0,08 – 0,15	0,08 – 0,16
0,05 – 0,11	0,08 – 0,15	0,10 – 0,18	0,12 – 0,22	0,12 – 0,24	0,13 – 0,25
0,05 – 0,11	0,08 – 0,15	0,10 – 0,18	0,12 – 0,22	0,12 – 0,24	0,13 – 0,25
0,05 – 0,11	0,08 – 0,15	0,10 – 0,18	0,12 – 0,22	0,12 – 0,24	0,13 – 0,25
0,05 – 0,11	0,08 – 0,15	0,10 – 0,18	0,12 – 0,22	0,12 – 0,23	0,13 – 0,24
0,05 – 0,12	0,08 – 0,15	0,10 – 0,18	0,12 – 0,20	0,12 – 0,23	0,16 – 0,25
0,05 – 0,12	0,08 – 0,15	0,10 – 0,18	0,12 – 0,20	0,12 – 0,23	0,16 – 0,25
0,05 – 0,12	0,08 – 0,15	0,10 – 0,18	0,12 – 0,20	0,12 – 0,23	0,16 – 0,25
0,05 – 0,12	0,08 – 0,15	0,10 – 0,18	0,12 – 0,20	0,12 – 0,23	0,16 – 0,25
0,05 – 0,12	0,08 – 0,15	0,12 – 0,20	0,12 – 0,23	0,15 – 0,24	0,16 – 0,25
0,05 – 0,11	0,06 – 0,12	0,08 – 0,15	0,09 – 0,16	0,10 – 0,17	0,11 – 0,19
0,05 – 0,11	0,06 – 0,12	0,08 – 0,15	0,09 – 0,16	0,10 – 0,17	0,11 – 0,19
0,05 – 0,11	0,06 – 0,12	0,08 – 0,15	0,09 – 0,16	0,10 – 0,17	0,11 – 0,19
0,05 – 0,11	0,08 – 0,16	0,12 – 0,20	0,15 – 0,25	0,16 – 0,28	0,18 – 0,30
0,05 – 0,11	0,08 – 0,16	0,12 – 0,20	0,15 – 0,25	0,16 – 0,28	0,18 – 0,30
0,05 – 0,11	0,08 – 0,16	0,12 – 0,20	0,15 – 0,25	0,16 – 0,28	0,18 – 0,30
0,05 – 0,11	0,08 – 0,16	0,12 – 0,20	0,15 – 0,25	0,16 – 0,28	0,18 – 0,30
0,05 – 0,11	0,08 – 0,16	0,12 – 0,20	0,15 – 0,25	0,16 – 0,28	0,18 – 0,30
0,05 – 0,11	0,08 – 0,16	0,12 – 0,20	0,15 – 0,25	0,16 – 0,28	0,18 – 0,30
0,05 – 0,12	0,08 – 0,15	0,10 – 0,20	0,12 – 0,22	0,14 –0,23	0,15 – 0,26
0,05 – 0,12	0,08 – 0,15	0,10 – 0,20	0,12 – 0,22	0,14 –0,23	0,15 – 0,26
0,05 – 0,12	0,08 – 0,15	0,10 – 0,20	0,12 – 0,22	0,14 –0,23	0,15 – 0,26
0,05 – 0,12	0,08 – 0,15	0,10 – 0,20	0,12 – 0,22	0,14 –0,23	0,15 – 0,26
0,05 – 0,12	0,08 – 0,15	0,10 – 0,20	0,12 – 0,22	0,14 –0,23	0,15 – 0,26
0,05 – 0,12	0,08 – 0,15	0,10 – 0,20	0,12 – 0,22	0,14 –0,23	0,15 – 0,26
0,05 – 0,12	0,08 – 0,15	0,10 – 0,20	0,12 – 0,22	0,14 –0,23	0,15 – 0,26
0,05 – 0,12	0,08 – 0,15	0,10 – 0,20	0,12 – 0,22	0,14 –0,23	0,15 – 0,26
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–
0,04 – 0,11	0,06 – 0,14	0,08 – 0,18	0,10 – 0,22	0,14 – 0,23	0,15 – 0,24
0,04 – 0,11	0,06 – 0,14	0,08 – 0,18	0,10 – 0,22	0,14 – 0,23	0,15 – 0,24
0,04 – 0,11	0,06 – 0,14	0,08 – 0,18	0,10 – 0,22	0,14 – 0,23	0,15 – 0,24
0,04 – 0,11	0,06 – 0,14	0,08 – 0,18	0,10 – 0,22	0,14 – 0,23	0,15 – 0,24
0,04 – 0,11	0,06 – 0,14	0,08 – 0,18	0,10 – 0,22	0,14 – 0,23	0,15 – 0,24
0,04 – 0,11	0,06 – 0,14	0,08 – 0,18	0,10 – 0,22	0,14 – 0,23	0,15 – 0,24
0,04 – 0,11	0,06 – 0,14	0,08 – 0,18	0,10 – 0,22	0,14 – 0,23	0,15 – 0,24

STANDARD FEED RATE CHART FOR MILLING INSERTS *f_z in mm/eff. cutting edge*

Inserts	End Mills			Helical End Mills			Square Shoulder Cutters
	DIN-Shaft	Screw-In Type	Modular	DIN-Shaft	Modular	Shell Mills	
							
AOCT060204FR-P	0,05-0,10	0,05-0,10	0,06-0,10	0,05-0,08	0,06-0,10	0,06-0,10	0,06-0,12
AOCT110304FR-P	0,10-0,15	0,10-0,15	0,12-0,18	0,10-0,12	0,10-0,15	0,10-0,15	0,12-0,20
AOCT110308FR-P	0,10-0,15	0,10-0,15	0,12-0,18	0,10-0,12	0,10-0,15	0,10-0,15	0,12-0,20
AOMT060202R	0,05-0,10	0,05-0,10	0,06-0,10	0,05-0,08	0,06-0,10	0,06-0,10	0,06-0,12
AOMT060202R-DT1	0,05-0,12	0,05-0,12	0,05-0,12				0,05-0,15
AOMT060204R	0,05-0,10	0,05-0,10	0,06-0,10	0,05-0,08	0,06-0,10	0,06-0,10	0,06-0,12
AOMT060208R	0,05-0,10	0,05-0,10	0,06-0,10	0,05-0,08	0,06-0,10	0,06-0,10	0,06-0,12
AOMT060216R	0,05-0,10	0,05-0,10	0,06-0,10	0,05-0,08	0,06-0,10	0,06-0,10	0,06-0,12
AOMT110304R	0,10-0,15	0,10-0,15	0,12-0,18	0,10-0,12	0,10-0,15	0,10-0,15	0,12-0,20
AOMT110308R	0,10-0,15	0,10-0,15	0,12-0,18	0,10-0,12	0,10-0,15	0,10-0,15	0,12-0,20
AOMT110316R	0,10-0,15	0,10-0,15	0,12-0,18	0,10-0,12	0,10-0,15	0,10-0,15	0,12-0,20
AOMT110332R	0,10-0,15	0,10-0,15	0,12-0,18	0,10-0,12	0,10-0,15	0,10-0,15	0,12-0,20
AOMT160508FR	0,15-0,20	0,15-0,20	0,15-0,25		0,20-0,25	0,20-0,25	0,15-0,30
AOMT160508R	0,15-0,20	0,15-0,20	0,15-0,25		0,20-0,25	0,20-0,25	0,15-0,30
AOMT160516R	0,15-0,20	0,15-0,20	0,15-0,25		0,20-0,25	0,20-0,25	0,15-0,30
AOMT160524R	0,15-0,20	0,15-0,20	0,15-0,25		0,20-0,25	0,20-0,25	0,15-0,30
AOMT160532R	0,15-0,20	0,15-0,20	0,15-0,25		0,20-0,25	0,20-0,25	0,15-0,30
AOMT160540R	0,15-0,20	0,15-0,20	0,15-0,25		0,20-0,25	0,20-0,25	0,15-0,30
AOMT160550R	0,15-0,20	0,15-0,20	0,15-0,25		0,20-0,25	0,20-0,25	0,15-0,30
AOMT160564R	0,15-0,20	0,15-0,20	0,15-0,25		0,20-0,25	0,20-0,25	0,15-0,30
APCT080304FR	0,10-0,12	0,10-0,12	0,10-0,15	0,10-0,12	0,10-0,15	0,10-0,15	0,10-0,20
APCT080304FR-P	0,10-0,12	0,10-0,12	0,10-0,15	0,10-0,12	0,10-0,15	0,10-0,15	0,10-0,20
APKT080304R	0,10-0,12	0,10-0,12	0,10-0,15	0,10-0,12	0,10-0,15	0,10-0,15	0,10-0,20
APKT080304R-DT1	0,06-0,20	0,06-0,20	0,06-0,20				0,06-0,20
APKT080304R-DT2	0,06-0,20	0,06-0,20	0,06-0,20				0,06-0,20
BCCT130404FR	0,10-0,15		0,12-0,20	0,10-0,12	0,12-0,20	0,12-0,20	0,15-0,20
BCCT130404FR-P	0,10-0,15		0,12-0,20	0,10-0,12	0,12-0,20	0,12-0,20	0,15-0,20
BCKT130402R-DT1	0,06-0,20						0,06-0,20
BCKT130402R-DT2	0,06-0,20						0,06-0,20
BCKT130404R	0,10-0,15		0,12-0,20	0,10-0,12	0,12-0,20	0,12-0,20	0,15-0,20
BCKT130410R	0,10-0,15		0,12-0,20	0,10-0,12	0,12-0,20	0,12-0,20	0,15-0,20
BCKT130415R	0,10-0,15		0,12-0,20	0,10-0,12	0,12-0,20	0,12-0,20	0,15-0,20
BCKT130420R	0,10-0,15		0,12-0,20	0,10-0,12	0,12-0,20	0,12-0,20	0,15-0,20
CDE313L021							
CDE313L021 - J							
CDE313L021T00							
CDE322L005							
CDE322L005 - J							
CDE322L005T00							
CNHU060310N							

The indicated standard feed rate values (f_z) refer to a width of cut of 50–100 % of the cutter diameter.
For widths of cut ae ≤ 1/3 x D_c (cutter diameter) higher f_z values can be used for milling. For further details please refer to "determination of feed rate per tooth f_z based on medium chip thickness hm".
For the finishing inserts the feed rate per rotation of the cutter f_u is indicated in [mm/U].

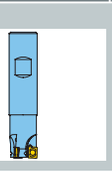
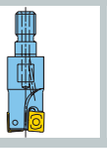
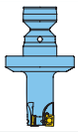
STANDARD FEED RATE CHART FOR MILLING INSERTS *f_z in mm/eff. cutting edge*

Insert	Face Mills		Side and Face Cutters	Form Cutters		Plunge Mills	Copy Mills
	Face Mills	Finishing Cutters		Chamfering Cutters	T-Slot Cutters		
							
AOCT060204FR-P				0,06-0,12			
AOCT110304FR-P							
AOCT110308FR-P							
AOMT060202R				0,06-0,12			
AOMT060202R-DT1							
AOMT060204R				0,06-0,12			
AOMT060208R				0,06-0,12			
AOMT060216R				0,06-0,12			
AOMT110304R							
AOMT110308R							
AOMT110316R							
AOMT110332R							
AOMT160508FR							
AOMT160508R							
AOMT160516R							
AOMT160524R							
AOMT160532R							
AOMT160540R							
AOMT160550R							
AOMT160564R							
APCT080304FR							
APCT080304FR-P							
APKT080304R							
APKT080304R-DT1							
APKT080304R-DT2							
BCCT130404FR				0,20-0,30			
BCCT130404FR-P				0,20-0,30			
BCKT130402R-DT1							
BCKT130402R-DT2							
BCKT130404R				0,20-0,30			
BCKT130410R				0,20-0,30			
BCKT130415R				0,20-0,30			
BCKT130420R				0,20-0,30			
CDE313L021						0,10-0,25	
CDE313L021 - J						0,10-0,25	
CDE313L021T00						0,10-0,20	
CDE322L005						0,10-0,25	
CDE322L005 - J						0,10-0,25	
CDE322L005T00						0,10-0,20	
CNHU060310N							0,10-0,30

The indicated standard feed rate values (f_z) refer to a width of cut of 50–100 % of the cutter diameter.
For widths of cut ae ≤ 1/3 x D_c (cutter diameter) higher f_z values can be used for milling. For further details please refer to "determination of feed rate per tooth f_z based on medium chip thickness hm".
For the finishing inserts the feed rate per rotation of the cutter f_u is indicated in [mm/U].

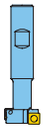
Subject to technical changes

STANDARD FEED RATE CHART FOR MILLING INSERTS *f_z in mm/eff. cutting edge*

Inserts	End Mills			Helical End Mills			Square Shoulder Cutters
	DIN-Shaft	Screw-In Type	Modular	DIN-Shaft	Modular	Shell Mills	
							
CNHU110420N							
DND324L103 - J							
DND324L104T34 - J							
DPD324L123 - A							
DPD324L124 - A							
GCXF071601N							
GCXF082202N							
GCXF092402N							
GCXF113102N							
GCXF114103N							
NCET0802MOR							
NCET1002MOR							
NCEX1203MOR							
NCEX1605MOR							
NCEX2005MOR							
NCEX2506MOR							
NPHG1003MOR							
NPHG1204MOR							
NPHG1604MOR							
NPHG2004MOR							
NPHG2506MOR							
NPHG3007MOR							
OFCT05T3AFFN-P							
OFCT05T3TN							
OFCT0705AFFN-P							
OFCT0705AFFR-W							
OFMT05T3AFN-HR							
OFMT0705AFR-HR							
OFMT0705AFTN							
OFMW05T3AFTN							
OFMW0705AFTN							
PNCQ0804ZNTN							
PNCU0805GNFR-P							
PNCU0805GNR							
PNCU0805GNTR							
PNCU0805GNTR-W							
RCLT1606MON-CC							
RCLT1606MON-CC1							
RCLT1606MON-CP							
RCLT1606MOTN-PH							

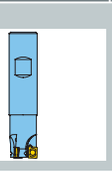
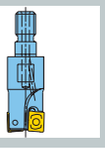
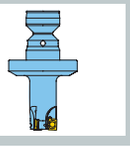
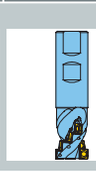
The indicated standard feed rate values (f_z) refer to a width of cut of 50–100 % of the cutter diameter.
For widths of cut ae ≤ 1/3 x D_c (cutter diameter) higher f_z values can be used for milling. For further details please refer to "determination of feed rate per tooth f_z based on medium chip thickness hm".
For the finishing inserts the feed rate per rotation of the cutter f_u is indicated in [mm/U].

STANDARD FEED RATE CHART FOR MILLING INSERTS *f_z in mm/eff. cutting edge*

Insert	Face Mills		Side and Face Cutters	Form Cutters		Plunge Mills	Copy Mills
	Face Mills	Finishing Cutters		Chamfering Cutters	T-Slot Cutters		
							
CNHU110420N							0,10-0,40
DND324L103 - J						0,10-0,30	
DND324L104T34 - J							
DPD324L123 - A						0,10-0,20	
DPD324L124 - A						0,10-0,20	
GCXF071601N			0,08-0,15				
GCXF082202N			0,08-0,15				
GCXF092402N			0,08-0,15				
GCXF113102N			0,08-0,15				
GCXF114103N			0,08-0,15				
NCET0802MOR							0,08-0,15
NCET1002MOR							0,08-0,15
NCEX1203MOR							0,10-0,20
NCEX1605MOR							0,10-0,20
NCEX2005MOR							0,10-0,25
NCEX2506MOR							0,10-0,25
NPHG1003MOR							0,10-0,20
NPHG1204MOR							0,10-0,20
NPHG1604MOR							0,10-0,25
NPHG2004MOR							0,10-0,25
NPHG2506MOR							0,10-0,30
NPHG3007MOR							0,10-0,30
OFCT05T3AFFN-P	0,15-0,30						
OFCT05T3TN	0,20-0,30						
OFCT0705AFFN-P	0,15-0,30						
OFCT0705AFFR-W	f_u=1-3						
OFMT05T3AFN-HR	0,10-0,25						
OFMT0705AFR-HR	0,15-0,30						
OFMT0705AFTN	0,20-0,30						
OFMW05T3AFTN	0,25-0,40						
OFMW0705AFTN	0,30-0,50						
PNCQ0804ZNTN							
PNCU0805GNFR-P	0,25-0,40						
PNCU0805GNR	0,25-0,30						
PNCU0805GNTR	0,25-0,40						
PNCU0805GNTR-W	f_u=1-3,6						
RCLT1606MON-CC							0,10-0,25
RCLT1606MON-CC1							0,10-0,25
RCLT1606MON-CP							0,10-0,25
RCLT1606MOTN-PH							0,30-0,70

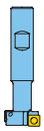
The indicated standard feed rate values (f_z) refer to a width of cut of 50–100 % of the cutter diameter.
For widths of cut ae ≤ 1/3 x D_c (cutter diameter) higher f_z values can be used for milling. For further details please refer to "determination of feed rate per tooth f_z based on medium chip thickness hm".
For the finishing inserts the feed rate per rotation of the cutter f_u is indicated in [mm/U].

STANDARD FEED RATE CHART FOR MILLING INSERTS *f_z in mm/eff. cutting edge*

Inserts	End Mills			Helical End Mills			Square Shoulder Cutters
	DIN-Shaft	Screw-In Type	Modular	DIN-Shaft	Modular	Shell Mills	
							
RHHT0802MOFN-P							
RHHT0802MOTN							
RHHT0802MOTN-P							
RHHT1003MOFN-P							
RHHT1003MOTN							
RHHT1003MOTN-P							
RHHT1204MOFN-P							
RHHT1204MOTN							
RHHT1204MOTN-P							
RHHT1605MOFN-P							
RHHT1605MOTN							
RHHT1605MOTN-P							
RHHW0602MOTN							
RHHW0802MOTN							
RHHW1003MOTN							
RHHW1003MOTN - J							
RHHW1204MOTN							
RHHW1204MOTN - J							
RHHW1605MOTN							
RHHW1605MOTN - J							
RHKT1605MOTN-PH							
RHKT2006MOTN-PH							
RHKW1003MOTN							
RHKW1003MOTN - J							
RHKW1204MOTN							
RHKW1204MOTN - J							
RHKW1605MOTN							
RHKW1605MOTN - J							
RHKW2006MOTN							
RHKW2006MOTN - J							
SCLT050204N-PH[1)]							
SDCT080305FN	0,10-0,15		0,12-0,18	0,10-0,12	0,12-0,15	0,12-0,15	0,12-0,20
SDCT080305FN-P	0,10-0,15		0,12-0,18	0,10-0,12	0,12-0,15	0,12-0,15	0,12-0,20
SDE-31-001 - J							
SDE-31-002 - J							
SDE-42-001 - J							
SDE-42-002 - J							
SDE-42-003 - J							
SDE-43-001 - J							
SDGT07T308-HP[1)]							

The indicated standard feed rate values (f_z) refer to a width of cut of 50–100 % of the cutter diameter.
For widths of cut ae ≤ 1/3 x D_c (cutter diameter) higher f_z values can be used for milling. For further details please refer to "determination of feed rate per tooth f_z based on medium chip thickness hm".
For the finishing inserts the feed rate per rotation of the cutter f_u is indicated in [mm/U].

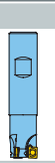
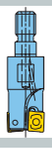
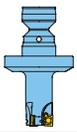
STANDARD FEED RATE CHART FOR MILLING INSERTS *f_z in mm/eff. cutting edge*

Insert	Face Mills		Side and Face Cutters	Form Cutters		Plunge Mills	Copy Mills
	Face Mills	Finishing Cutters		Chamfering Cutters	T-Slot Cutters		
							
RHHT0802MOFN-P							0,10-0,30
RHHT0802MOTN							0,10-0,30
RHHT0802MOTN-P							0,10-0,20
RHHT1003MOFN-P							0,15-0,40
RHHT1003MOTN							0,15-0,40
RHHT1003MOTN-P							0,10-0,20
RHHT1204MOFN-P							0,20-0,40
RHHT1204MOTN							0,25-0,50
RHHT1204MOTN-P							0,10-0,25
RHHT1605MOFN-P							0,20-0,40
RHHT1605MOTN							0,25-0,50
RHHT1605MOTN-P							0,20-0,40
RHHW0602MOTN							0,20-0,30
RHHW0802MOTN							0,20-0,35
RHHW1003MOTN							0,25-0,40
RHHW1003MOTN - J							0,25-0,40
RHHW1204MOTN							0,25-0,45
RHHW1204MOTN - J							0,25-0,45
RHHW1605MOTN							0,30-0,50
RHHW1605MOTN - J							0,30-0,50
RHKT1605MOTN-PH							0,30-0,60
RHKT2006MOTN-PH							0,40-0,80
RHKW1003MOTN							0,30-0,60
RHKW1003MOTN - J							0,30-0,60
RHKW1204MOTN							0,30-0,70
RHKW1204MOTN - J							0,30-0,70
RHKW1605MOTN							0,40-0,80
RHKW1605MOTN - J							0,40-0,80
RHKW2006MOTN							0,50-1,00
RHKW2006MOTN - J							0,50-1,00
SCLT050204N-PH[1)]							
SDCT080305FN			0,10-0,12	0,15-0,20	0,10-0,15		
SDCT080305FN-P			0,10-0,12	0,15-0,20	0,10-0,15		
SDE-31-001 - J			0,10-0,15				
SDE-31-002 - J			0,10-0,15				
SDE-42-001 - J			0,10-0,15				
SDE-42-002 - J			0,10-0,15				
SDE-42-003 - J			0,10-0,15				
SDE-43-001 - J			0,10-0,15				
SDGT07T308-HP[1)]							

The indicated standard feed rate values (f_z) refer to a width of cut of 50–100 % of the cutter diameter.
For widths of cut ae ≤ 1/3 x D_c (cutter diameter) higher f_z values can be used for milling. For further details please refer to "determination of feed rate per tooth f_z based on medium chip thickness hm".
For the finishing inserts the feed rate per rotation of the cutter f_u is indicated in [mm/U].

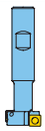
Subject to technical changes

STANDARD FEED RATE CHART FOR MILLING INSERTS *f_z in mm/eff. cutting edge*

Inserts	End Mills			Helical End Mills			Square Shoulder Cutters
	DIN-Shaft	Screw-In Type	Modular	DIN-Shaft	Modular	Shell Mills	
							
SDGT140512-HP[1)]							
SDMT080305N	0,10-0,15		0,12-0,18	0,10-0,12	0,12-0,15	0,12-0,15	0,12-0,20
SDMT120608FR					0,15-0,20	0,15-0,20	0,15-0,25
SDMT120608R					0,15-0,20	0,15-0,20	0,15-0,25
SDMW080305TN	0,10-0,15		0,12-0,18	0,10-0,12	0,12-0,15	0,12-0,15	0,12-0,20
SDMW080305TN-W	0,10-0,15		0,12-0,18	0,10-0,12	0,12-0,15	0,12-0,15	0,12-0,20
SECT09T3AFFN							
SECT09T3AFFN-P							
SEE-31-101							
SEE-31-102							
SEE-42-101							
SEE-42-102							
SEE-42-103							
SEE-43-101							
SEKT09T3AFN							
SHET110502FR-P		0,10-0,20					0,15-0,25
SHET110505FR-P		0,10-0,20					0,15-0,25
SHET110508FR-P		0,10-0,20					0,15-0,25
SHET110516FR-P		0,10-0,20					0,15-0,25
SHET110524FN-P		0,10-0,20					0,15-0,25
SHET110532FN-P		0,10-0,20					0,15-0,25
SHET110540FN-P		0,10-0,20					0,15-0,25
SHGT050204-HP[1)]							
SHGT060204-HP[1)]							
SHGT090408-HP[1)]							
SHGT110408-HP[1)]							
SHLT060204N-PH[1)]							
SHLT090408N-PH1[1)]							
SHLT110408N-PH1[1)]							
SHLT140508TN-HR						0,15-0,25	0,20-0,30
SHLT140508TN-HS						0,15-0,25	0,20-0,30
SHLT1405APTN-HR							
SHLT1405APTN-HR - A							
SPLT07T308N-PH[1)]							
SPLT140512N-PH[1)]							
UHLD08T310R-M							
UHLD08T310R-MR							
UHLD130515R-M							
UHLD130515R-MR							
XEET250408R-P		0,10-0,20					0,10-0,25

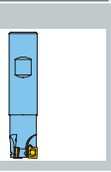
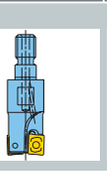
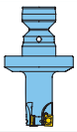
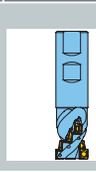
The indicated standard feed rate values (f_z) refer to a width of cut of 50–100 % of the cutter diameter.
For widths of cut ae ≤ 1/3 x D_c (cutter diameter) higher f_z values can be used for milling. For further details please refer to "determination of feed rate per tooth f_z based on medium chip thickness hm".
For the finishing inserts the feed rate per rotation of the cutter f_u is indicated in [mm/U].

STANDARD FEED RATE CHART FOR MILLING INSERTS *f_z in mm/eff. cutting edge*

Insert	Face Mills		Side and Face Cutters	Form Cutters		Plunge Mills	Copy Mills
	Face Mills	Finishing Cutters		Chamfering Cutters	T-Slot Cutters		
							
SDGT140512-HP[1)]							
SDMT080305N			0,10-0,12	0,15-0,20	0,10-0,15		
SDMT120608FR							
SDMT120608R							
SDMW080305TN			0,10-0,12	0,15-0,20	0,10-0,15		
SDMW080305TN-W			0,10-0,12	0,15-0,20	0,10-0,15		
SECT09T3AFFN	0,10-0,20						
SECT09T3AFFN-P	0,10-0,20						
SEE-31-101			0,10-0,15				
SEE-31-102			0,10-0,15				
SEE-42-101			0,10-0,15				
SEE-42-102			0,10-0,15				
SEE-42-103			0,10-0,15				
SEE-43-101			0,10-0,15				
SEKT09T3AFN	0,10-0,20						
SHET110502FR-P							
SHET110505FR-P							
SHET110508FR-P							
SHET110516FR-P							
SHET110524FN-P							
SHET110532FN-P							
SHET110540FN-P							
SHGT050204-HP[1)]							
SHGT060204-HP[1)]							
SHGT090408-HP[1)]							
SHGT110408-HP[1)]							
SHLT060204N-PH[1)]							
SHLT090408N-PH1[1)]						0,10-0,20	
SHLT110408N-PH1[1)]							
SHLT140508TN-HR	0,20-0,30						
SHLT140508TN-HS	0,20-0,30						
SHLT1405APTN-HR	0,20-0,40						
SHLT1405APTN-HR - A							
SPLT07T308N-PH[1)]							
SPLT140512N-PH[1)]							
UHLD08T310R-M							1,00-2,00
UHLD08T310R-MR							1,00-2,50
UHLD130515R-M							1,00-2,50
UHLD130515R-MR							1,00-3,00
XEET250408R-P							

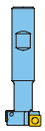
The indicated standard feed rate values (f_z) refer to a width of cut of 50–100 % of the cutter diameter.
For widths of cut ae ≤ 1/3 x D_c (cutter diameter) higher f_z values can be used for milling. For further details please refer to "determination of feed rate per tooth f_z based on medium chip thickness hm".
For the finishing inserts the feed rate per rotation of the cutter f_u is indicated in [mm/U].

STANDARD FEED RATE CHART FOR MILLING INSERTS *f_z in mm/eff. cutting edge*

Inserts	End Mills			Helical End Mills			Square Shoulder Cutters
	DIN-Shaft	Screw-In Type	Modular	DIN-Shaft	Modular	Shell Mills	
							
XEET250408R-PWRWK		0,10-0,20					0,10-0,25
XEET250432R-P		0,10-0,20					0,10-0,25
YDA322L101							

The indicated standard feed rate values (f_z) refer to a width of cut of 50–100 % of the cutter diameter.
For widths of cut ae ≤ 1/3 x D_c (cutter diameter) higher f_z values can be used for milling. For further details please refer to "determination of feed rate per tooth f_z based on medium chip thickness hm".
For the finishing inserts the feed rate per rotation of the cutter f_u is indicated in [mm/U].

STANDARD FEED RATE CHART FOR MILLING INSERTS *f_z in mm/eff. cutting edge*

Insert	Face Mills		Side and Face Cutters	Form Cutters		Plunge Mills	Copy Mills
	Face Mills	Finishing Cutters		Chamfering Cutters	T-Slot Cutters		
							
XEET250408R-PWRWK							
XEET250432R-P							
YDA322L101		f_u = 1-10					

The indicated standard feed rate values (f_z) refer to a width of cut of 50–100 % of the cutter diameter.
For widths of cut ae ≤ 1/3 x D_c (cutter diameter) higher f_z values can be used for milling. For further details please refer to "determination of feed rate per tooth f_z based on medium chip thickness hm".
For the finishing inserts the feed rate per rotation of the cutter f_u is indicated in [mm/U].

NOTES

DETERMINATION OF FEED RATE PER TOOTH fz BASED ON AVERAGE CHIP THICKNESS hm

h_m = average chip thickness

If a_e < 1/3 D_c higher f_z-values can be used for milling

→ higher productivity
→ longer tool life

Approximation formula for a_e = width of cut smaller than 1/3 of tool diameter:

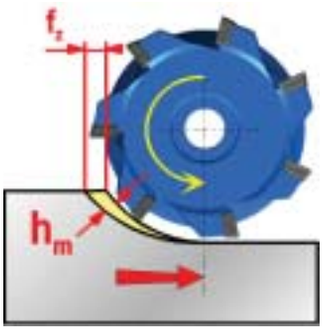
average chip thickness

$$h_m = f_z \bullet \sqrt{\frac{a_e}{D_c}}$$

feed rate per tooth

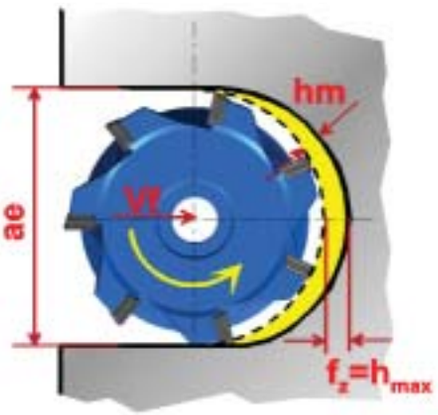
$$f_z = h_m \bullet \sqrt{\frac{D_c}{a_e}}$$

Pay attention for for stable clamping and workpiece conditions!



Insert	APKT08	AOMT06	AOMT11	AOMT16	BCKT13	SDMT08	SDMW08	SHLT14	SHEW15	SDMT12		
hm	0,08	0,06	0,1	0,15	0,12	0,08	0,12	0,20	0,30	0,15		

FOR EXAMPLE:



Channel milling

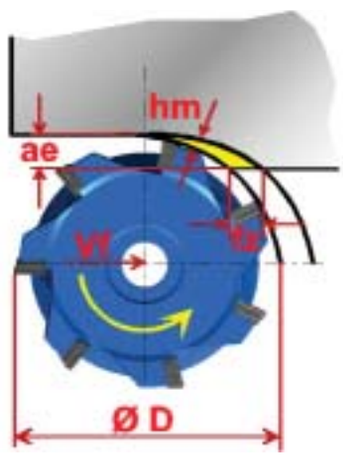
h_{max} = **0,12** = f_z
D_c = 50 mm
a_e = 50 mm

v_f = 680 mm/min

At 2J1F050R00
v_c = 150 m/min
n = 950 RPM

AOMT11...
h_m = 0,1 (see chart)
D_c = 50 mm
z = 6

v_f = f_z • z • n



Shoulder milling (rough boring)

h_m = 0,1
D_c = 50 mm
a_e = 2 mm

$f_z = 0,1 \bullet \sqrt{50/2}$
f_z = **0,5** mm/tooth

v_f = 2850 mm/min

Subject to technical changes

WORKPIECE MATERIAL COMPARISON CHART

	Machinability-Group	Germany W.-Nr.	Germany DIN	Great Britain BS	Great Britain EN	France AFNOR	Italy UNI	Sweden SS	Japan JIS	USA AISI/SAE	$k_{c1.1}$	m_c
P	**Construction Steel**											
	1	1.0401	C15	080M15	–	CC12	C15C16	1350	–	1015	1229	0,21
	1	1.0402	C22	050A20	2C	CC20	C20C21	1450	–	1020	1229	0,21
	1/2	1.0501	C35	060A35	–	CC35	C35	1550	–	1035	1388	0,22
	2	1.0503	C45	080M46	–	CC45	C45	1650	–	1045	1388	0,22
	2/3	1.0535	C55	070M55	–	–	C55	1655	–	1055	1524	0,24
	3	1.0601	C60	080A62	43D	CC55	C60	–	–	1060	1524	0,24
	1	1.0715	9SMn28	230M07	–	S250	CF9SMn28	1912	SUM22	1213	1229	0,21
	1	1.0718	9SMnPb28	–	–	S250Pb	CF9SMnPb28	1914	SUM22L	12L13	1229	0,21
	1	1.0722	10SPb20	–	–	10PbF2	CF10SPb20	–	–	–	1229	0,21
	2	1.0726	35S20	212M36	8M	35MF4	–	1957	–	1140	1388	0,22
	1/2	1.0736	9SMn36	240M07	1B	S300	CF9SMn36	–	–	1215	1229	0,21
	1/2	1.0737	9SMnPb36	–	–	S300Pb	CF9SMnPb36	1926	–	12L14	1229	0,21
	2/3	1.0904	55Si7	250A53	45	55S7	55Si8	2085	–	9255	1615	0,24
	2/3	1.0961	60SiCr7	–	–	60SC7	60SiCr8	–	–	9262	1615	0,24
	1	1.1141	Ck15	080M15	32C	XC12	C16	1370	S15C	1015	1229	0,21
	2	1.1157	40Mn4	150M36	15	35M5	–	–	–	1039	1388	0,22
	1/2	1.1158	Ck25	–	–	–	–	–	S25C	1025	–	–
	2/3	1.1167	36Mn5	–	–	40M5	–	2120	SMn438(H)	1335	1388	0,22
	2/3	1.1170	28Mn6	150M28	14A	20M5	C28Mn	–	SCM1	1330	1365	0,22
	2/3	1.1183	Cf35	060A35	–	XC38TS	C36	1572	S35C	1035	1388	0,22
	2/3	1.1191	Ck45	080M46	–	XC42	C45	1672	S45C	1045	1388	0,22
	2/3	1.1203	Ck55	070M55	–	XC55	C50	–	S55C	1055	1524	0,24
	3/4	1.1213	Cf53	060A52	–	XC48TS	C53	1674	S50C	1050	1388	0,22
	3/4	1.1221	Ck60	080A62	43D	XC60	C60	1678	S58C	1060	1524	0,24
	9	1.1274	Ck101	060A96	–	–	–	1870	SUP4	1095	1524	0,24
	10	1.3401	X120Mn12	Z120M12	–	Z120M12	XG120Mn12	–	SCMnH/1	–	3003	0,24
	9	1.3505	100Cr6	534A99	31	100C6	100Cr6	2258	SUJ2	52100	–	–
	9	1.5415	15Mo3	1501-240	–	15D3	16Mo3KW	2912	–	ASTM A20Gr.A	1524	0,24
	8	1.5423	16Mo5	1503-245-420	–	–	16Mo5	–	–	4520	1524	0,24
	5	1.5622	14Ni6	–	–	16N6	14Ni6	–	–	ASTMA350LF5	1524	0,24
	9	1.5662	X8Ni9	1501-509; 510	–	–	X10Ni9	–	–	ASTM A353	–	–
	9	1.5680	12Ni19	–	–	Z18N5	–	–	–	2515	2230	0,23
	6	1.5710	36NiCr6	640A35	111A	35NC6	–	–	SNC236	3135	1638	0,24
	6	1.5732	14NiCr10	–	–	14NC11	16NiCr11	–	SNC415(H)	3415	1524	0,24
	6	1.5752	14NiCr14	655M13; 655M12	36A	12NC15	–	–	SNC815(H)	3415; 3310	1524	0,24
	6	1.6511	36CrNiMo4	816M40	110	40NCD3	38NiCrMo4(KB)	–	–	9840	1615	0,24
	6	1.6523	21NiCrMo2	805M20	362	20NCD2	20NiCrMo2	2506	SNCM220(H)	8620	1570	0,24
	6	1.6546	40NiCrMo22	311-Type7	–	–	40NiCrMo2(KB)	–	SNCM240	8740	1615	0,24
	6	1.6582	34CrNiMo6	817M40	24	35NCD6	35NiCrMo6(KB)	2541	–	4340	1615	0,24
	6	1.6587	17CrNiMo6	820A16	–	18NCD6	–	–	–	–	1524	0,24
	6	1.6657	14NiCrMo134	832M13	36C	–	15NiCrMo13	–	–	–	1524	0,24
	2	1.7015	15Cr3	523M15	–	12C3	–	–	SCr415(H)	5015	1524	0,24
	6	1.7033	34Cr4	530A32	18B	32C4	34Cr4(KB)	–	SCr430(H)	5132	1570	0,24
	6	1.7035	41Cr4	530M40	18	42C4	41Cr4	–	SCr440(H)	5140	1615	0,24
	6	1.7045	42Cr4	–	–	–	–	2245	SCr440	5140	1615	0,24
	6	1.7131	16MnCr5	(527M20)	–	16MC5	16MnCr5	2511	–	5115	1524	0,24

WORKPIECE MATERIAL COMPARISON CHART

	Machinability-Group	Germany W.-Nr.	Germany DIN	Great Britain BS	Great Britain EN	France AFNOR	Italy UNI	Sweden SS	Japan JIS	USA AISI/SAE	$k_{c1.1}$	m_c
P	6	1.7176	55Cr3	527A60	48	55C3	–	–	SUP9(A)	5155	1615	0,24
	6	1.7218	25CrMo4	1717CDS110	–	25CD4	25CrMo4(KB)	2225	SCM420	4130	1570	0,24
	6	1.7220	34CrMo4	708A37	19B	35CD4	35CrMo4	2234	SCM432; SCCRM3	4137; 4135	1615	0,24
	6	1.7223	41CrMo4	708M40	19A	42CD4TS	41CrMo4	2244	SCM440	4140; 4142	1615	0,24
	6	1.7225	42CrMo4	708M40	19A	42CD4	42CrMo4	2244	SCM440(H)	4140	1615	0,24
	6	1.7262	15CrMo5	–	–	12CD4	–	2216	SCM415(H)	–	1524	0,24
	6	1.7335	13CrMo4 4	1501-620Gr.27	–	15CD3.5; 15CD4.5	14CrMo4 5	–	–	ASTM A182; F11; F12	1524	0,24
	6	1.7361	32CrMo12	722M24	40B	30CD12	32CrMo12	2240	–	–	1615	0,24
	6	1.7380	10CrMo9 10	1501-622; Gr.31; 45	–	12CD9; 10	12CrMo9, 10	2218	–	ASTM A182; F22	1524	0,24
	6	1.7715	14MoV6 3	1503-660-440	–	–	–	–	–	–	1524	0,24
	7	1.8159	50CrV4	735A50	47	50CV4	50CrV4	2230	SUP10	6150	1615	0,24
	9	1.8509	41CrAlMo7	905M39	41B	40CAD6, 12	41CrAlMo7	2940	–	–	1615	0,24
	9	1.8523	39CrMoV13 9	897M39	40C	–	36CrMoV12	–	–	–	1615	0,24
	Tool Steel											
	6/7	1.1545	C105W1	–	–	$Y_1$105	C98KU; C100KU	1880	–	W.110	1524	0,24
	6/7	1.1663	C125W	–	–	$Y_2$120	C120KU	–	SK2	W.112	1524	0,24
	9	1.2067	100Cr6	BL3	–	Y100C6	–	–	–	L3	1615	0,24
	10/11	1.2080	X210Cr12	BD3	–	Z200Cr12	X210Cr13KU;	–	SKD1	D3	2230	0,23
							X250Cr12KU					
	11	1.2311	40CrMnMo7	–	–	–	35CrMo8KU	–	–	–	–	–
	11	1.2312	40CrMnMoS8-6	–	–	–	–	–	–	–	–	–
	11	1.2343	X38CrMoV5-1	BH11	–	Z38CDV5	X37CrMoV51 1KU	–	SKD6	H11	–	–
	11	1.2344	X40CrMoV5-1	BH13	–	Z40CDV5	X35CrMoV05KU	2242	SKD61	H13	2230	0,23
		–	–	–	–	–	X40CrMoV511KU	–	–	–	–	–
	11	1.2363	X100CrMoV5-1	BA2	–	Z100CDV5	X100CrMoV51KU	2260	SKD12	A2	2230	0,23
	11	1.2367	X38CrMoV5-3	–	–	Z38CDV5-3	–	–	–	–	–	–
	11/12	1.2379	X155CrVMo12-1	BD2	–	Z160CDV12	X155CrVMo12 1 KU	2310	SKD11	D2	–	–
	11	1.2419	105WCr6	–	–	105WC13	10WCr6; 107WCr5KU	2140	SKS31; SKS2, SKS3	–	1615	0,24
	10/11	1.2436	X210CrW12	–	–	–	X215CrW121KU	2312	SKD2	–	2230	0,23
	10/11	1.2542	45WCrV17	BS1	–	–	45WCrV8KU	2710	–	S1	1615	0,24
	10/11	1.2581	X30WCrV9 3;	BH21	–	Z30WCV9	X30WCrV9 3KU	–	SKD5	H21	2230	0,23
	10/11	1.2601	X165CrMoV12	–	–	–	X165CrMoW12KU	2310	–	–	2230	0,23
	10/11	1.2713	55NiCrMoV6	–	–	55NCDV7	–	–	SKT4	L6	1615	0,24
	10/11	1.2738	40CrMnNiMo8-6-4	–	–	–	–	–	–	–	–	–
	10/11	1.2833	100V1	BW2	–	$Y_1$105V; 100V2	–	–	SKS43	W210	–	–
	10/11	1.3243	S 6-5-2-5	–	–	Z85WDKCV-	HS 6-5-2-5	2723	SKH55	–	2230	0,23
						06-05-05-04-02						
	10/11	1.3255	S 18-1-2-5	BT4	–	Z80WKCV-	X78WCo1805KU	–	SKH3	T4	2230	0,23
						18-05-04-01						
	10/11	1.3343	S 6-5-2	BM2	–	Z85WDCV-	X82WMo0605KU	2722	SKH9	M2	2230	0,23
						06-05-04-02						
	10/11	1.3348	S 2-9-2	–	–	Z100WCWV-	HS 2-9-2	2782	–	M7	2230	0,23
						09-04-02-02						
	10/11	1.3355	S 18-0-1	BT1	–	Z80WCV-	X75W18KU	–	SKH2	T1	2230	0,23
						18-04-01						

Subject to technical changes

WORKPIECE MATERIAL COMPARISON CHART

	Machin-ability-Group	Germany W.-Nr.	Germany DIN	Great Britain BS	Great Britain EN	France AFNOR	Italy UNI	Sweden SS	Japan JIS	USA AISI/SAE	$k_{c1.1}$	m_c
M	**Stainless steels and temperature resisting steels**											
	12/13	1.4000	X6Cr13	403S17	–	Z6C13	X6Cr13	2301	SUS403	403	1706	0,21
	12/13	1.4001	X7Cr14	–	–	–	–	–	–	–	1706	0,21
	12/13	1.4006	X10Cr13	410S21	56A	Z10C14	X12Cr13	2302	SUS410	410	1706	0,21
	12/13	1.4016	X6Cr17	430S15	60	Z8C17	X8Cr17	2320	SUS430	430	1706	0,21
	12/13	1.4027	G-X20Cr14	420C29	56B	Z20C13M	–	–	SCS2	–	–	–
	12/13	1.4034	X46Cr13	420S45	56D	Z40CM;	X40Cr14	2304	SUS420J2	–	1706	0,21
						Z38C13M						
	12/13	1.4057	X20CrNi172	431S29	57	Z15CNi6.02	X16CrNi16	2321	SUS431	431	–	–
	12/13	1.4104	X12CrMoS17	–	–	Z10CF17	X10CrS17	2383	SUS430F	430F	1706	0,21
	12/13	1.4113	X6CrMo171	434S17	–	Z8CD17.01	X8CrMo17	2325	SUS434	434	1706	0,21
	12/13	1.4313	X5CrNi13 4	425C11	–	Z4CND13.4M	–	–	SCS5	–	1706	0,21
	12/13	1.4408	G-X6CrNiMo18 10	316C16	–	–	–	–	SCS14	–	1957	0,2
	12/13	1.4718	X45CrSi9 3	401S45	52	Z45CS 9	X45CrSi8	–	SUH1	HW3	2230	0,23
	12/13	1.4724	X10CrAl13	403S17	–	Z10C13	X101CrA112	–	SUS405	405	–	–
	12	1.4742	X10CrAl18	430S15	60	Z12CAS18	X8Cr17	–	SUH21	–	–	–
	12/13	1.4747	X80CrNiSi20	443S65	59	Z80CSN20.02	X80CrSiNi20	–	SUH4	HNV6	–	–
	12	1.4762	X10CrAl24	–	–	Z10CAS24	X16Cr26	2322	SUH446	446	–	–
	14	1.4301	X5CrNi18 10	304S15	58E	Z6CN18.09	X5CrNi1810	2332	SUS304	304	1957	0,2
	14	1.4305	X10CrNiS18 9	303S21	58M	Z10CNF 18.09	X10CrNiS 18.09	2346	SUS303	303	1957	0,2
	14	1.4306	X2CrNi19 11	304S12;	–	Z2CN18.10;	X2CrNi18.11	2352	SCS19; SUS304L	304L	–	–
				304C12		Z3CN19.10						
	14	1.4308	G-X6CrNi18 9	304C15	–	Z6CN18.10M	–	2333	SCS13	CF8	1957	0,2
	14	1.4310	X12CrNi177	301S21	–	Z12CN17.07	X12CrNi1707	2331	SUS301	301	1957	0,2
	14	1.4311	X2CrNiN18 10	304S62	–	Z2CN18.10	–	2371	SUS304LN	304LN	1957	0,2
	14	1.4401	X5CrNiMo17122	316S16	58J	Z6CND17.11	X5CrNiMo17 12	2347	SUS316	316	1957	0,2
	14	1.4429	X2CrNiMoN17133	–	–	Z2CND17.13	–	2375	SUS316LN	316LN	1957	0,2
	14	1.4435	X2CrNiMo18143	316S12	–	Z2CND17.13	X2CrNiMo17 13	2353	SCS16	316L	–	–
	14	1.4438	X2CrNiMo17133	317S12	–	Z2CND19.15	X2CrNiMo18 16	2367	SUS317L	317L	–	–
	14	1.4460	X8CrNiMo275	–	–	–	–	2324	SUS329L;	329	–	–
									SCH11, SCS11			
	12/13	1.4541	X6CrNiTi18 10	2337	321S12	Z6CNT18.10	X6CrNiTi18 11	58B	SUS321	321	1957	0,2
	12/13	1.4550	X6CrNiNb18 10	347S17	58F	Z6CNNb18.10	X6CrNiNb18 11	2338	SUS347	347	1957	0,2
	12/13	1.4571	X6CrNiMoTi17122	320S17	58J	Z6NDT17.12	X6CrNiMoTi17 12	2350	–	316Ti	1957	0,2
	12/13	1.4581	G-X5CrNi	318C17	–	Z4CNDNb	XG8CrNiMo18 11	–	SCS22	–	1957	0,2
			MoNb18 10			18 12M						
	12/13	1.4583	X10CrNi	–	–	Z6CNDNb;	X6CrNiMoNb17 13	–	–	318	1957	0,2
			MoNb18 12			17 13B						
	14	1.4828	X15CrNiSi20 12	309S24	–	Z15CNS20.12	–	–	SUH309	309	1229	0,28
	14	1.4845	X12CrNi25 21	310S24	–	Z12CN25 20	X6CrNi25 20	2361	SUH310	310S	1957	0,2
	14	1.4864	X12NiCr36 16	–	–	Z12NCS35.16	–	–	SUH330	330	2366	0,24
	14	1.4865	G-X40NiCrSi38 18	330C11	–	–	XG50NiCr39 19	–	SCH15	–	2366	0,24
	14	1.4871	X53CrMnNiN219	349S54;	–	Z52CMN21.09	X53CrMnNiN219	–	SUH35, SUH36;	EV8	1706	0,21
				321S12	58B				SU321			
	14	1.4878	X12CrNiTi18 9	321S320	58C	Z6CNT18.12B	X6CrNiTi1811	–	–	321	1957	0,2

WORKPIECE MATERIAL COMPARISON CHART

	Machinability-Group	Germany W.-Nr.	Germany DIN	Great Britain BS	Great Britain EN	France AFNOR	Italy UNI	Sweden SS	Japan JIS	USA AISI/SAE	$k_{c1.1}$	m_c
K	**Grey cast iron, unalloyed**											
	15	0.6010	GG10	–	–	Ft 10 D	–	01 10	–	No 20 B	1047	0,2
	15	0.6015	GG15	Grade 150	–	Ft 15 D	–	01 15	–	No 25 B	1047	0,2
	15	0.6020	GG20	Grade 220	–	Ft 20 D	–	01 20	–	No 30 B	1047	0,2
	16	0.6025	GG25	Grade 260	–	Ft 25 D	–	01 25	–	No 35 B; No 40 B	1138	0,24
	16	0.6030	GG30	Grade 300	–	R 30 D	–	01 30	–	No 45 B	1229	0,28
	16	0.6035	GG35	Grade 350	–	Ft 35 D	–	01 35	–	No 50 B	1229	0,28
	16	0.6040	GG40	Grade 400	–	Ft 40 D	–	01 40	–	No 55 B	1229	0,28
	Grey cast iron, alloyed											
	16	–	DIN4694	3468: 1974	–	–	–	MB	–	ASTM	–	–
	16	–	GGL-	–	–	A32-301	–	ISO-215	–	A436-72	–	–
	16	–	NiCr 20 2	L-NiCr 20 2	–	L-NC 20 2	–	05 23	–	Type 2	–	–
	Nodular grey cast iron, unalloyed											
	17	0.7040	GGG 40	SNG 420/12	–	FCS 400-12	GS 370-17	07 17-02	–	60-40-18	1115	0,25
	17	0.7043	GGG 40.3	SNG 370/17	–	FGS 370-17	–	07 17-12	–	–	1115	0,25
	17	0.7033	GGG 35.3	–	–	–	–	07 17-15	–	–	1115	0,25
	18	0.7050	GGG 50	SNG 500/7	–	FGS 500-7	GS 500	07 27-02	–	80-55-06	1229	0,28
	18	0.7060	GGG 60	SNG 600/3	–	FGS 600-3	–	07 32-03	–	–	1229	0,28
	18	0.7070	GGG70	SNG 700/2	–	FGS 700-2	GS 700-2	07 37-01	–	100-70-03	1229	0,28
	Cast iron, alloyed											
	18	–	DIN 1694	–	–	L-NM 13 7	–	07 72	–	–	–	–
	18	–	GGG NiMn 13 7	L-NiMn 13 7	–	L-NC 20 2	–	07 76	–	Type 2	–	–
	18	–	GGG NiCr 20 2	L-NC 20 2	–	–	–	–	–	–	–	–
	Malleable cast iron											
	19	0.8135	GTS-35	B 340/12	–	MN 35-10	–	08 15	–	32510	1115	0,25
	20	0.8145	GTS-45	P 440/7	–	–	–	08 52	–	40010	1292	0,3
	20	0.8155	GTS-55	P 510/4	–	MP50-5	–	08 54	–	50005	1292	0,3
	20	0.8165	GTS-65	P 570/3	–	MP 60-3	–	08 58	–	70003	1292	0,3
	20	0.8170	GTS-70	P690/2	–	MP 70-2	–	08 62	–	80002	1292	0,3

WORKPIECE MATERIAL COMPARISON CHART

	Machin-ability-Group	Germany W.-Nr.	Germany DIN	Great Britain BS	Great Britain EN	France AFNOR	Italy UNI	Sweden SS	Japan JIS	USA AISI/SAE	$k_{c1.1}$	m_c
N	**Non-ferrous materials**											
K	23/24	–	G-AlSi12	LM20	–	–	–	4260	–	–	–	–
	23/24	–	GD-AlSi12	–	–	–	–	4247	–	–	–	–
	23/24	–	GD-AlSi8Cu3	LM24	–	–	–	4250	–	–	–	–
	23/24	–	G-AlSi10Mg	LM9	–	–	–	4253	–	–	–	–
	23/24	–	G-AlSi12	LM6	–	–	–	4261	–	–	–	–
S	**High-temperature resistant alloys**											
M	31	1.4864	X12NiCrSi	–	–	Z12NCS35.16	–	–	SUH 330	330	–	–
	31	1.4865	G-X40NiCrSi	330C11	–	–	XG50NiCr	–	SCH 15	–	–	–
	31	2.4603	–	–	–	NC22FeD	–	–	–	5390 A	–	–
	31	2.4630	NiCr20Ti	HR5, 203-4	–	NC20T	–	–	–	–	–	–
	31	2.4856	NiCr22Mo9N	–	–	NC22FeDNB	–	–	–	5666	3003	0,24
	31	LW2.496	CoCr20W15	–	–	KC20WN	–	–	–	5537 C	–	–
	31	2.4375	NiCu30Al	3072-76	–	–	–	–	–	4676	3003	0,24
	32	2.4631	NiCr20TiAk	Hr40, 601	–	NC20TA	–	–	–	–	3003	0,24
	32	2.4973	NiCr19Co11	–	–	NC19KDT	–	–	–	AMS 5399	–	–
	34	LW2.467	S-NiCr13A16	3146-3	–	NC12AD	–	–	–	5391	–	–
	34	LW2.466	NiCr19Fe19	HR8	–	NC19FeNb	–	–	–	5660	–	–
	34	LW2.466	NiCr19Fe19	–	–	NC20K14	–	–	–	5383	–	–
	34	–	CoCr22W14	–	–	KC22WN	–	–	–	–	–	–
	34	LW2.467	NiCo15Cr10	–	–	–	–	–	–	–	–	–
	37	–	TiAl14Mo4Sn4Si0.5	–	–	–	–	–	–	–	–	–
	37	–	TiAl5Sn2.5	TA14/17	–	T-A5E	–	–	–	–	–	–
	37	–	TiAl6V4	TA10-13/TA2	–	T-A6V	–	–	–	–	–	–
	37	–	TiAl6V4ELI	TA11	–	–	–	–	–	–	–	–

The values of $k_{c1.1}$ are valid for 6° positive rake angle. One degree variation of rake angle changes the specific cutting force $k_{c1.1}$ by 1,5 % (+/–).
$k_{c1.1}$ is valid for a_p = 1 mm and h_m = 1 mm. By the exponent m_c the specific cutting force gets converted to the given workpiece material.

NOTES

GENERAL FORMULAE FOR MILLING OPERATIONS

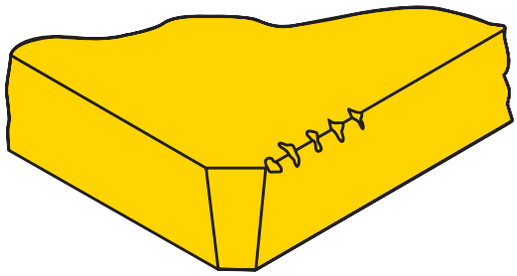
Value	Unit	Formula
RPM	min^{-1}	$n = \frac{v_c \cdot 1000}{D \cdot \pi}$
Cutting speed	m/min	$v_c = \frac{D \cdot \pi \cdot n}{1000}$
Feed rate	mm/min	$v_f = f_z \cdot Z_{eff} \cdot n$
Feed per tooth	mm	$f_z = \frac{v_f}{Z_{eff} \cdot n}$
Chip removal rate	cm^3/min	$Q = \frac{a_e \cdot a_p \cdot v_f}{1000}$
Average chip thickness	mm	$h_m = f_z \cdot \sqrt{a_e/D}$
Specific cutting force	N/mm^2	$k_c = h_m^{-mc} \cdot k_{c1.1}$
Spindle power consumption	kW	$P_c = \frac{a_p \cdot a_e \cdot v_f \cdot k_c}{60 \cdot 10^6}$
Motor power consumption	kW	$P_{mot} = \frac{P_c}{\eta}$

Calculation Example	
Workpiece Material:	Ck60 (1.1221)
Cutter Type:	5N6L080R00 (Face Mill 45°)
Insert:	OFMT0705AFR-HR
Cutter Diameter:	80 mm
Effective number of teeth:	5
Depth of cut a_p:	4 mm
Width of cut a_e:	50 mm
Cutting speed v_c:	220 m/min
Feed per tooth f_z:	0,25 mm
Efficiency η:	0,80 (supposed)
Calculation of number of revolutions:	$n = \frac{220 \cdot 1000}{80 \cdot \pi} = 875$ RPM
Calculation of feed rate:	$v_f = 0{,}25 \cdot 875 \cdot 5 = 1094$ mm/min
Calculation of chip removal rate:	$Q = \frac{4 \cdot 50 \cdot 1094}{1000} = 219\ cm^3/min$
Calculation of average chip thickness:	$h_m = 0.25 \cdot \sqrt{50/80} = 0.2$ mm
Calculation of specific cutting force:	$k_c = 0.2^{-0.24} \cdot 1524 = 2242\ N/mm^2$
Calculation of power consumption:	$P_c = \frac{4 \cdot 50 \cdot 1094 \cdot 2242}{60 \cdot 10^6} = 8.1$ kW
Calculation of motor capacity:	$P_{mot} = \frac{8.1}{0.8} = 10.2$ kW

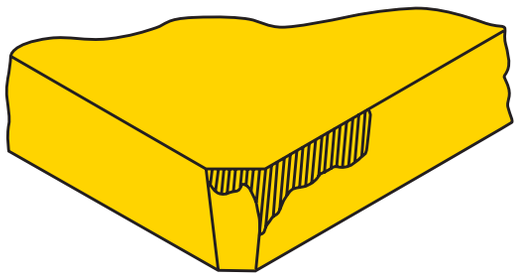
GENERAL FORMULAE FOR MILLING OPERATIONS

Explanation of Catalog Parameters and Formulae Symbols		
Formulae Symbols	**Units**	**Designation**
D	mm	Nominal diameter
D1	mm	Outside diameter
d	mm	Adaption diameter
H	mm	Height of tool
L	mm	Length of tool
L1	mm	Effective working length
L2	mm	Adjusting dimension
a	mm	Length of cut
b	mm	Width of cut
B	mm	Collar width
d1	mm	Collar diameter
d2	mm	Biggest external diameter
d3	mm	Bolt circle diameter
M	mm	Thread diameter
M1	mm	Thread diameter 1
T_s	–	Special thread
k	°	Bevel angle
V	mm	Range of adjustment
Z	Quantity	Number of inserts
Z_{eff}	Quantity	Effective number of teeth
Z_s	Quantity	Number of finishing inserts
n	min^{-1}	RPM
MOD	–	Size of modular adaption
MT	–	Size of morse taper
a_e	mm	Width of cut
a_p	mm	Depth of cut
f_z	mm	Feed per tooth
f_u	mm/U	Feed per revolution
h_m	mm	Average chip thickness
k_c	N/mm^2	Specific cutting force
$k_{c1.1}$	N/mm^2	Specific cutting force with reference to a_e = 1 mm and a_p = 1 mm
P_{mot}	kW	Power consumption
P_c	kW	Spindle power consumption
Q	cm^3/min	Chip removal rate
v_c	m/min	Cutting speed
v_f	mm/min	Feed rate
η	%	Mechanical efficiency
m_c	–	Exponent

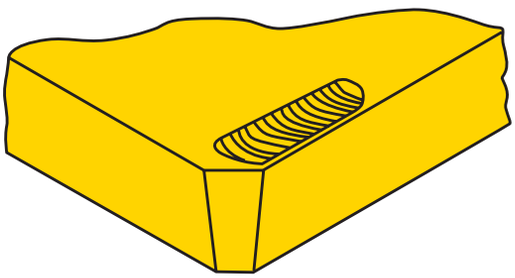
Appearance of wear patterns on milling inserts and their significance



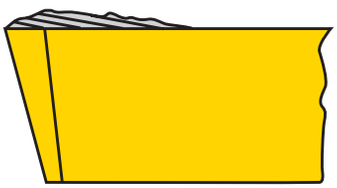
Cutting edge chipping
Small chipped spots along or on the cutting edge, mostly in combination with flank wear.



Flank wear
Extreme flank wear reduces clearance angle and leads to bad surface finish.

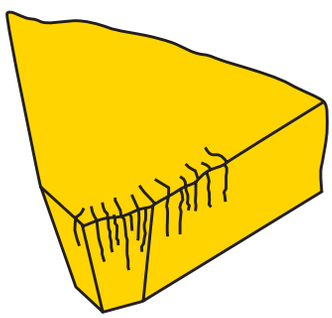


Cratering
Cratering changes the cutting edge geometry and thus weakens the cutting edge which finally leads to the edge break-off.



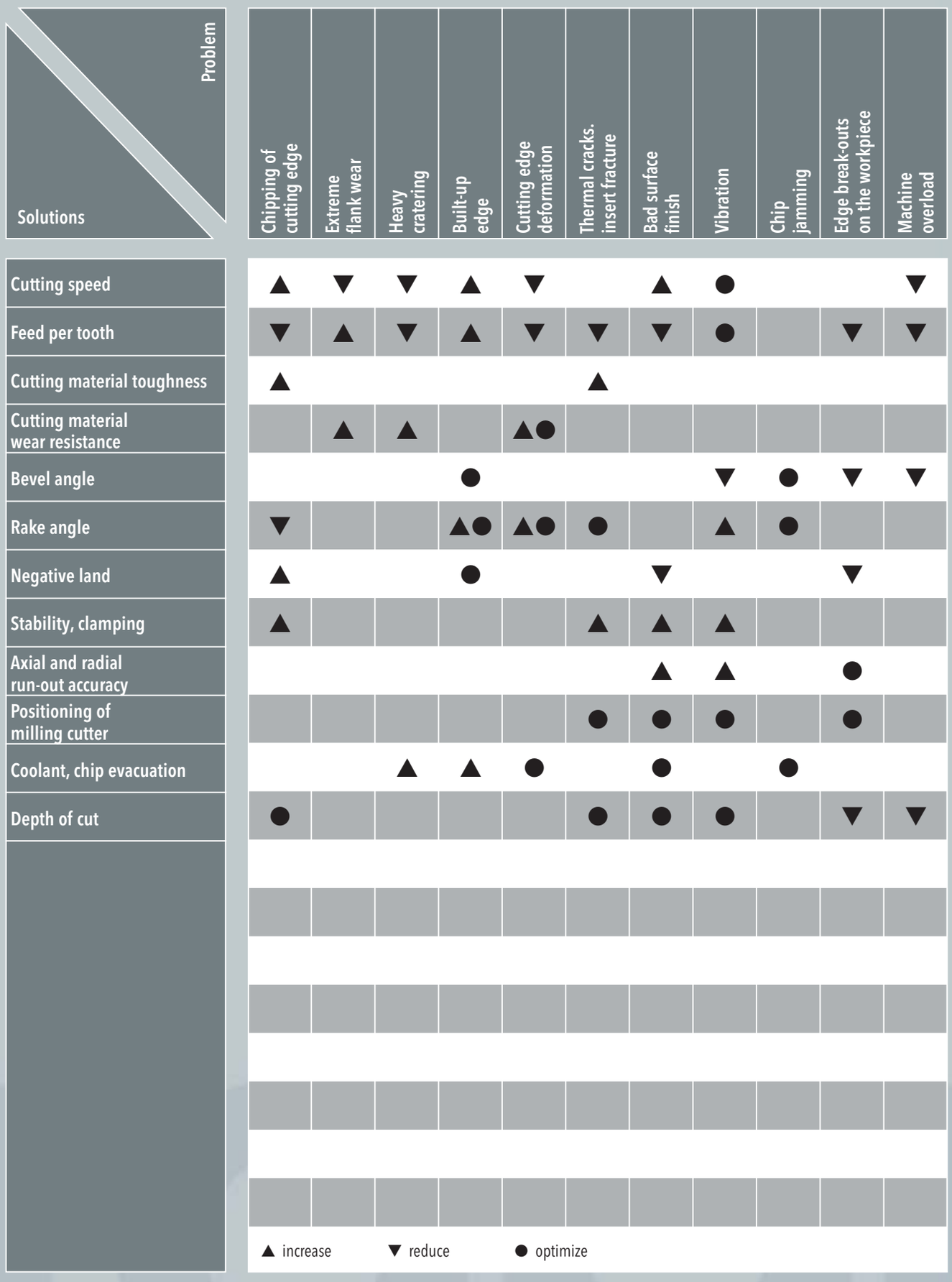
Built-up cutting edge
Built-up on the cutting edge may occur when machining soft materials. Often caused by low cutting speed and bad chip flow.

Plastic deformation
High mechanical loads and high cutting temperature can result in plastic deformation of the cutting edge.



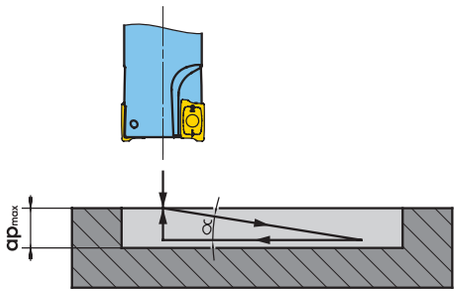
Thermal cracks
Small cracks which run in perpendicular direction to the cutting edge, caused by thermal fluctuation in the interrupted cut. Danger of insert breaking.

TROUBLE SHOOTING FOR MILLING PROBLEMS



Subject to technical changes

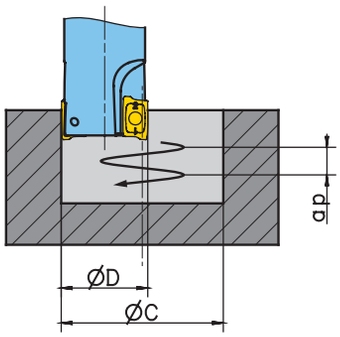
RAMPING DATA – PLUNGING DATA



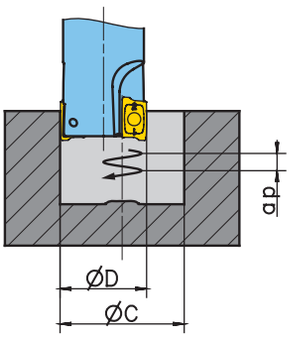
h_{max}: maximum plunging depth per level [mm]

RAMPING DATA – CIRCULAR INTERPOLATION BORE MILLING

Hole with flat bottom



Hole with uneven bottom or through hole



Ramping data see following pages 58 - 63!

NOTES

RAMPING DATA – PLUNGING DATA

Insert plunging depth h_{max}	Tool-Ø	Ø9,5		Ø10		Ø11,5		Ø12		Ø13,5	
AOMT060202R 5,7 mm	Ramping angle	10,5°		10,0°		7,0°		6,5°		5,5°	
	~bottom Cmin - Cmax	11-17	0,9-4,4	12-18	1,1-4,4	15-21	1,4-3,7	16-22	1,4-3,6	19-25	1,5-3,5
	_ bottom Cmin - Cmax	17-18	4,4-4,5	18-19	4,4-4,5	21-22	4,1	22-23	3,6-3,9	25-26	3,5-3,8
APKT080304R 7,5 mm	Ramping angle	3,0°		3,0°		3,8°		4,0°		3,0°	
	~ bottom Cmin - Cmax							12-19	0,1-1,5	16-25	0,4-1,8
	_ bottom Cmin - Cmax	14-17	0,7-1,1	15-18	0,6-1,3	18-21	1,3-1,9	19-22	1,5-2,1	25-26	1,8-2,0
AOMT110304R 11,0 mm	Ramping angle										
	~ bottom Cmin - Cmax										
	_ bottom Cmin - Cmax										
AOMT160508R 16,0 mm	Ramping angle										
	~ bottom Cmin - Cmax										
	_ bottom Cmin - Cmax										
RCLT1606M0N-CC 8,0 mm	Ramping angle										
	~ bottom Cmin - Cmax										
	_ bottom Cmin - Cmax										
RHHW0602M0TN 3,0 mm	Ramping angle							10°			
	~ bottom Cmin - Cmax							15-18	0,5		
	_ bottom Cmin - Cmax							18-(24)	0,5		
RHHW0802M0TN 4,0 mm	Ramping angle										
	~ bottom Cmin - Cmax										
	_ bottom Cmin - Cmax										
RHKW1003M0TN 5,0 mm	Ramping angle										
	~ bottom Cmin - Cmax										
	_ bottom Cmin - Cmax										
RHKW1204M0TN 6,0 mm	Ramping angle										
	~ bottom Cmin - Cmax										
	_ bottom Cmin - Cmax										
RHKW1605M0TN 8,0 mm	Ramping angle										
	~ bottom Cmin - Cmax										
	_ bottom Cmin - Cmax										
RHKW2006M0TN 10,0 mm	Ramping angle										
	~ bottom Cmin - Cmax										
	_ bottom Cmin - Cmax										
SDMT080305N 7,5 mm	Ramping angle										
	~ bottom Cmin - Cmax										
	_ bottom Cmin - Cmax										
SEKT09T3AFN 4,5 mm	Ramping angle										
	~ bottom Cmin - Cmax										
	_ bottom Cmin - Cmax										
SHLT1405APTN-HR 7,0 mm	Ramping angle										
	~ bottom Cmin - Cmax										
	_ bottom Cmin - Cmax										
SHEW1504AJTN 9,0 mm	Ramping angle										
	~ bottom Cmin - Cmax										
	_ bottom Cmin - Cmax										
OFMT05T3AFN-HR 3,4 mm	Ramping angle										
	~ bottom Cmin - Cmax										
	_ bottom Cmin - Cmax										
OFMT0705AFR-HR 4,8 mm	Ramping angle										
	~ bottom Cmin - Cmax										
	_ bottom Cmin - Cmax										
UHLD08T310R-M 1 mm	Ramping angle										
	~ bottom Cmin - Cmax										
	_ bottom Cmin - Cmax										
UHLD130515R-M 1,5 mm	Ramping angle										
	~ bottom Cmin - Cmax										
	_ bottom Cmin - Cmax										
XEET250408R-P 21,0 mm	Ramping angle										
	~ bottom Cmin - Cmax										
	_ bottom Cmin - Cmax										

~ bottom: uneven bottom _ bottom: flat bottom (...) max. diameter but no flat bottom

RAMPING DATA – PLUNGING DATA

Ø14	Ø15	Ø16	Ø18	Ø19	Ø20	Ø22	Ø24
5,2°	4,4°	4,0°		2,6°	2,5°	2,3°	
20-26 | 1,5-3,4	22-28 | 1,6-3,1	24-30 | 1,6-3,1		30-36 | 1,6-2,4	32-38 | 1,7-2,5	36-42 | 1,7-2,5	
26-27 | 3,4-3,7	28-29 | 3,1-3,4	30-31 | 3,1-3,3		36-37 | 2,4-2,6	38-39 | 2,5-2,6	42-43 | 2,5-2,6	
2,5°	2,5°	2,5°	2,0°		1,8°		
17-26 | 0,4-1,6	19-27 | 0,5-1,6	21-27 | 0,8-1,4	25-31 | 0,8-1,2		29-35 | 0,8-1,0		
26-27 | 1,6-1,7	27-29 | 1,6-1,9	27-30 | 1,4-1,9	31-34 | 1,2-1,7		35-38 | 1,0-1,4		
		11,0°	10,0°		7,0°		
		20-28 | 2,0-7,0	23-32 | 2,5-7,0		26-35 | 2,3-5,8		
		28-31 | 7,0-10,0	32-35 | 7,0-10		35-39 | 5,8-7,3		
		5°			10°		
		23-26 | 0,5			31-34 | 0,5		
		26-(32) | 0,5			34-(40) | 0,5		
		40°					
		20-24 | 1					
		24-(32) | 1					
					40°		
					24-30 | 1,5		
					30-(40) | 1,5		
							40°
							28-36 | 2
							36-(48) | 2
		2,5°	2,5°		2,0°		
		17-22 | 0,3-0,9	21-26 | 0,9-0,9		24-30 | 0,3-0,9		
		22-30 | 0,9-1,9	26-34 | 0,9-1,9		30-38 | 0,9-1,9		
					17°		
					37-47 | 1,3		
					47-49 | 1,3		
					5,3°		
					25-28,8 | 1		
					28,8-(40) | 1		

~ bottom: uneven bottom _ bottom: flat bottom (...) max. diameter but no flat bottom

Subject to technical changes

RAMPING DATA – PLUNGING DATA

Insert plunging depth h_{max}	Tool-Ø	Ø25	Ø30	Ø32	Ø33	Ø35
AOMT060202R 5,7 mm	Ramping angle	2,0°	1,7°	1,6°		1,4°
	~ bottom Cmin - Cmax / ap bei Cmin - Cmax	42-48 | 1,7-2,5	52-58 | 1,7-2,6	56-62 | 1,7-2,6		62-68 | 1,7-2,5
	_ bottom Cmin - Cmax / ap bei Cmin - Cmax	48-49 | 2,5-2,6	58-59 | 2,6-2,7	62-63 | 2,6-2,7		68-69 | 2,5-2,6
APKT080304R 7,5 mm	Ramping angle	1,6°		1,5°		
	~ bottom Cmin - Cmax / ap at Cmin - Cmax	39-45 | 0,8-1,0		53-59 | 1,2-1,4		
	_ bottom Cmin - Cmax / ap at Cmin - Cmax	45-48 | 1,0-1,2		59-62 | 1,4-1,6		
AOMT110304R 11,0 mm	Ramping angle	5,5°		3,9°		3,3°
	~ bottom Cmin - Cmax / ap at Cmin - Cmax	36-46 | 3,3-6,4		50-60 | 3,9-6,0		56-66 | 3,8-5,6
	_ bottom Cmin - Cmax / ap at Cmin - Cmax	46-49 | 6,4-7,3		60-63 | 6,0-6,6		66-69 | 5,6-6,2
AOMT160508R 16,0 mm	Ramping angle			3,6°		
	~ bottom Cmin - Cmax / ap at Cmin - Cmax			46-58 | 3,0-5,0		
	_ bottom Cmin - Cmax / ap at Cmin - Cmax			58-62 | 5,0-5,5		
RCLT1606M0N-CC 8,0 mm	Ramping angle			24°		
	~ bottom Cmin - Cmax / ap at Cmin - Cmax			36-48 | 8		
	_ bottom Cmin - Cmax / ap at Cmin - Cmax			48-(64) | 8		
RHHW0602M0TN 3,0 mm	Ramping angle	7°				
	~ bottom Cmin - Cmax / ap at Cmin - Cmax	41-44 | 0,5				
	_ bottom Cmin - Cmax / ap at Cmin - Cmax	44-(50) | 0,5				
RHHW0802M0TN 4,0 mm	Ramping angle		8°			
	~ bottom Cmin - Cmax / ap at Cmin - Cmax		48-52 | 1			
	_ bottom Cmin - Cmax / ap at Cmin - Cmax		52-(60) | 1			
RHKW1003M0TN 5,0 mm	Ramping angle	17°	11°			8°
	~ bottom Cmin - Cmax / ap at Cmin - Cmax	34-40 | 1,5	44-50 | 1,5			54-60 | 1,5
	_ bottom Cmin - Cmax / ap at Cmin - Cmax	40-(50) | 1,5	50-(60) | 1,5			60-(70) | 1,5
RHKW1204M0TN 6,0 mm	Ramping angle			14°		11°
	~ bottom Cmin - Cmax / ap at Cmin - Cmax			45-52 | 2		51-58 | 2
	_ bottom Cmin - Cmax / ap at Cmin - Cmax			52-(64) | 2		58-(70) | 2
RHKW1605M0TN 8,0 mm	Ramping angle			40°		
	~ bottom Cmin - Cmax / ap at Cmin - Cmax			36-48 | 2,5		
	_ bottom Cmin - Cmax / ap at Cmin - Cmax			48-(64) | 2,5		
RHKW2006M0TN 10,0 mm	Ramping angle					
	~ bottom Cmin - Cmax / ap at Cmin - Cmax					
	_ bottom Cmin - Cmax / ap at Cmin - Cmax					
SDMT080305N 7,5 mm	Ramping angle	2,0°		1,6°		
	~ bottom Cmin - Cmax / ap at Cmin - Cmax	34-40 | 0,3-0,8		48-54 | 1,0-1,3		
	_ bottom Cmin - Cmax / ap at Cmin - Cmax	40-48 | 0,8-1,7		54-62 | 1,3-1,6		
SEKT09T3AFN 4,5 mm	Ramping angle	15°		10°		
	~ bottom Cmin - Cmax / ap at Cmin - Cmax	47-57 | 1,3		61-71 | 1,3		
	_ bottom Cmin - Cmax / ap at Cmin - Cmax	57-59 | 1,3		71-73 | 1,3		
SHLT1405APTN-HR 7,0 mm	Ramping angle					
	~ bottom Cmin - Cmax / ap at Cmin - Cmax					
	_ bottom Cmin - Cmax / ap at Cmin - Cmax					
SHEW1504AJTN 9,0 mm	Ramping angle					
	~ bottom Cmin - Cmax / ap at Cmin - Cmax					
	_ bottom Cmin - Cmax / ap at Cmin - Cmax					
OFMT05T3AFN-HR 3,4 mm	Ramping angle			9°	7,8°	
	~ bottom Cmin - Cmax / ap at Cmin - Cmax			55-62 | 4,5	57-64 | 4,5	
	_ bottom Cmin - Cmax / ap at Cmin - Cmax			62-71 | 4,5	64-73 | 4,5	
OFMT0705AFR-HR 4,8 mm	Ramping angle					
	~ bottom Cmin - Cmax / ap at Cmin - Cmax					
	_ bottom Cmin - Cmax / ap at Cmin - Cmax					
UHLD08T310R-M 1 mm	Ramping angle	3,5°		2°		1,9°
	~ bottom Cmin - Cmax / ap at Cmin - Cmax	35-38,8 | 1		49-52,8 | 1		55-58,8 | 1
	_ bottom Cmin - Cmax / ap at Cmin - Cmax	38,8-(50) | 1		52,8-(64) | 1		58,8-(70) | 1
UHLD130515R-M 1,5 mm	Ramping angle			2,5°		
	~ bottom Cmin - Cmax / ap at Cmin - Cmax			42-48,6 | 1,3-1,5		
	_ bottom Cmin - Cmax / ap at Cmin - Cmax			48,6-(64) | 1,5		
XEET250408R-P 21,0 mm	Ramping angle	20°		15°		
	~ bottom Cmin - Cmax / ap at Cmin - Cmax	28-48,4 | 3,4-20		42-62,4 | 8,4-20		
	_ bottom Cmin - Cmax / ap at Cmin - Cmax	48,4-49 | 20		62,4-63 | 20		

~ bottom: uneven bottom _ bottom: flat bottom (...) max. diameter but no flat bottom

RAMPING DATA – PLUNGING DATA

Ø40	Ø42	Ø50	Ø51	Ø52	Ø55	Ø63	Ø66
1,2° 72-78 | 1,7-2,5 78-79 | 2,5-2,6							
1,5° 69-75 | 2,3-2,8 75-78 | 2,8-3,1		1,5° 89-95 | 3,2-3,7 95-98 | 3,7-3,9				0,5° 115-121 | 1,4-1,6 121-124 | 1,6-1,7	
2,8° 66-76 | 4,0-5,5 76-79 | 5,5-6,0	2,7° 70-80 | 4,1-5,6 80-83 | 5,6-6,1	2,1° 86-96 | 4,1-5,3 96-99 | 5,3-5,6				1,7° 112-122 | 4,6-5,5 122-125 | 5,5-5,8	
2,6° 62-74 | 3,0-5,0 74-78 | 5,0-5,5		1,9° 82-94 | 3,3-4,6 94-98 | 4,6-5				1,4° 108-120 | 1,0-4,3 120-124 | 4,3-4,6	
16° 52-64 | 8 64-(80) | 8	14° 72-84 | 8 84-(100) | 8	9,5° 72-84 | 8 84-(100) | 8		9,0° 76-88 | 8 88-(104) | 8		6,5° 98-110 | 8 110-(126) | 8	6,0° 104-116 | 8 116-(132) | 8
	6° 74-78 | 1,5 78-(84) | 1,5			5° 88-94 | 1,5 94-(104) | 1,5			3,5° 116-122 | 1,5 122-(132) | 1,5
	8° 65-72 | 2 72-(84) | 2			5° 85-92 | 2 92-(104) | 2			5° 113-120 | 2 120-(132) | 2
	15° 55-68 | 2,5 68-(84) | 2,5			8° 76-88 | 2,5 88-(104) | 2,5			7° 104-116 | 2,5 116-(132) | 2,5
							7° 96-112 | 3 112-(132) | 3
1,5° 64-70 | 1,9-2,4 70-78 | 2,4-3,1		1,2° 84-90 | 2,2-2,6 90-98 | 2,6-3,1				1° 110-116 | 2,5-2,9 116-124 | 2,9-3,3	
8,0 77-87 | 1,3 87-89 | 1,3		6° 97-107 | 1,3 107-109 | 1,3				4,5° 123-133 | 1,3 133-135 | 1,3	
		9,7° 96-109 | 2,4 109-114 | 2,4				7,2° 122-135 | 2,4 135-140 | 2,4	
5,6° 71-78 | 4,5 78-87 | 4,5	5,5° 75-82 | 4,5 80-99 | 4,5	4,3° 91-98 | 4,5 98-107 | 4,5			3,8° 101-108 | 4,5 108-117 | 4,5	3,3° 117-124 | 4,5 124-133 | 4,5	
		5,5° 90-98 | 7 98-111 | 7	5,4° 92-100 | 7 100-113 | 7			4,5° 116-124 | 7 124-137 | 7	
1,8° 65-68,8 | 1 68,8-(80) | 1	1,7° 69-72,8 | 1 72,8-(84) | 1	1° 85-88,8 | 1 88,8-(100) | 1		0,9° 89-92,8 | 1 92,8-(104) | 1		0,9° 111-114,8 | 1 114,8-(126) | 1	0,7° 117-120,8 | 1 120,8-(132) | 1
	1,6° 62-68,6 | 1,5 68,6-(84) | 1,5			1,2° 80-88,6 | 1,5 88,6-(104) | 1,5			0,7° 110-116,6 | 1,5 116,6-(132) | 1,5
	10° 62-82,4 | 11,1-20 82,4-83 | 20	9° 78-98,4 | 13,9-20 98,4-99 | 20		9° 82-101,4 | 14,9-20 101,4-102 | 20		6° 103-124,4 | 13,2-20 124,4-125 | 20	6° 100-131,4 | 14,5-20 131 | 20

~ bottom: uneven bottom _ bottom: flat bottom (...) max. diameter but no flat bottom

Subject to technical changes

RAMPING DATA – PLUNGING DATA

Insert plunging depth h_{max}	Tool-Ø	Ø68	Ø72	Ø80	Ø88	Ø92
AOMT060202R 5,7 mm	Ramping angle ~ bottom Cmin - Cmax | ap at Cmin - Cmax _ bottom Cmin - Cmax | ap at Cmin - Cmax					
APKT080304R 7,5 mm	Ramping angle ~ bottom Cmin - Cmax | ap at Cmin - Cmax _ bottom Cmin - Cmax | ap at Cmin - Cmax			0,3° 149-155 | 1,1-1,2 155-158 | 1,2-1,3		
AOMT110304R 11,0 mm	Ramping angle ~ bottom Cmin - Cmax | ap at Cmin - Cmax _ bottom Cmin - Cmax | ap at Cmin - Cmax			1,3° 146-156 | 4,7-5,4 156-159 | 5,4-5,6		
AOMT160508R 16,0 mm	Ramping angle ~ bottom Cmin - Cmax | ap at Cmin - Cmax _ bottom Cmin - Cmax | ap at Cmin - Cmax			1° 142-154 | 3,3-4,0 154-158 | 4,0-4,2		
RCLT1606M0N-CC 8,0 mm	Ramping angle ~ bottom Cmin - Cmax | ap at Cmin - Cmax _ bottom Cmin - Cmax | ap at Cmin - Cmax			4,5° 132-144 | 8 144-(160) | 8		
RHHW0602M0TN 3,0 mm	Ramping angle ~ bottom Cmin - Cmax | ap at Cmin - Cmax _ bottom Cmin - Cmax | ap at Cmin - Cmax					
RHHW0802M0TN 4,0 mm	Ramping angle ~ bottom Cmin - Cmax | ap at Cmin - Cmax _ bottom Cmin - Cmax | ap at Cmin - Cmax					
RHKW1003M0TN 5,0 mm	Ramping angle ~ bottom Cmin - Cmax | ap at Cmin - Cmax _ bottom Cmin - Cmax | ap at Cmin - Cmax					
RHKW1204M0TN 6,0 mm	Ramping angle ~ bottom Cmin - Cmax | ap at Cmin - Cmax _ bottom Cmin - Cmax | ap at Cmin - Cmax			3° 141-148 | 2 148-(160) | 2		
RHKW1605M0TN 8,0 mm	Ramping angle ~ bottom Cmin - Cmax | ap at Cmin - Cmax _ bottom Cmin - Cmax | ap at Cmin - Cmax			5° 132-144 | 2,5 144-(160) | 2,5		
RHKW2006M0TN 10,0 mm	Ramping angle ~ bottom Cmin - Cmax | ap at Cmin - Cmax _ bottom Cmin - Cmax | ap at Cmin - Cmax			5° 97-131 | 3 131-(160) | 3		
SDMT080305N 7,5 mm	Ramping angle ~ bottom Cmin - Cmax | ap at Cmin - Cmax _ bottom Cmin - Cmax | ap at Cmin - Cmax			0,5° 144-150 | 1,7-1,9 150-158 | 1,9-2,1		
SEKT09T3AFN 4,5 mm	Ramping angle ~ bottom Cmin - Cmax | ap at Cmin - Cmax _ bottom Cmin - Cmax | ap at Cmin - Cmax			3° 157-167 | 1,3 167-170 | 1,3		
SHLT1405APTN-HR 7,0 mm	Ramping angle ~ bottom Cmin - Cmax | ap at Cmin - Cmax _ bottom Cmin - Cmax | ap at Cmin - Cmax			5,4° 156-169 | 2,4 169-174 | 2,4		
SHEW1504AJTN 9,0 mm	Ramping angle ~ bottom Cmin - Cmax | ap at Cmin - Cmax _ bottom Cmin - Cmax | ap at Cmin - Cmax			6,8° 157-176 | 1,3 176-178 | 1,3		
OFMT05T3AFN-HR 3,4 mm	Ramping angle ~ bottom Cmin - Cmax | ap at Cmin - Cmax _ bottom Cmin - Cmax | ap at Cmin - Cmax		2,9° 135-142 | 4,5 142-151 | 4,5	2,5° 151-158 | 4,5 158-167 | 4,5		2,2° 175-182 | 4,5 182-191 | 4,5
OFMT0705AFR-HR 4,8 mm	Ramping angle ~ bottom Cmin - Cmax | ap at Cmin - Cmax _ bottom Cmin - Cmax | ap at Cmin - Cmax	4,2° 126-134 | 7 134-147 | 7		3,5° 150-168 | 7 168-181 | 7	3,2° 166-174 | 7 174-187 | 7	
UHLD08T310R-M 1 mm	Ramping angle ~ bottom Cmin - Cmax | ap at Cmin - Cmax _ bottom Cmin - Cmax | ap at Cmin - Cmax			0,6° 145-148,8 | 1 148,8-(160) | 1		
UHLD130515R-M 1,5 mm	Ramping angle ~ bottom Cmin - Cmax | ap at Cmin - Cmax _ bottom Cmin - Cmax | ap at Cmin - Cmax			0,5° 138-144,6 | 1,5 144,6-(160) | 1,5		
XEET250408R-P 21,0 mm	Ramping angle ~ bottom Cmin - Cmax | ap at Cmin - Cmax _ bottom Cmin - Cmax | ap at Cmin - Cmax			5° 138-158,4 | 16-20 158,4-(159) | 20		

~ bottom: uneven bottom _ bottom: flat bottom (...) max. diameter but no flat bottom

RAMPING DATA – PLUNGING DATA

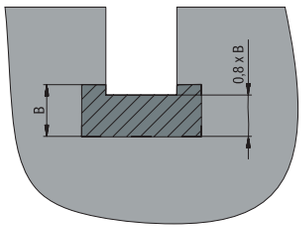
Ø100	Ø113	Ø117	Ø125	Ø160			
0,2°							
189-195 | 0,9-1,0							
195-198 | 1,0-1,1							
1,0°							
186-196 | 4,7-5,3							
196-199 | 5,3-5,4							
0,8°			0,6°	0,5°			
182-194 | 3,5-4,1			232-244 | 3,5-3,9	302-314 | 3,8-4,2			
194-198 | 4,1-4,2			244-248 | 3,9-4,0	314-318 | 4,2-4,3			
3,3°			2,8°	2,2°			
172-184 | 8			222-234 | 8	292-304 | 8			
184-(200) | 8			234-(250) | 8	304-(320) | 8			
4°			2°	2°			
172-184 | 2,5			222-234 | 2,5	292-304 | 2,5			
184-(200) | 2,5			234-(250) | 2,5	304-(320) | 2,5			
4°			2°	2°			
165-180 | 3			215-230 | 3	285-300 | 3			
180-(200) | 3			230-(250) | 3	300-(320) | 3			
2°							
197-207 | 1,3							
207-209 | 1,3							
4,2°			3,2°	2,5°			
196-209 | 2,4			246-259 | 2,4	316-329 | 2,4			
209-214 | 2,4			259-264 | 2,4	329-334 | 2,4			
5,2°			4°	3,1°			
197-216 | 1,3			347-266 | 1,3	317-339 | 1,3			
216-218 | 1,3			266-268 | 1,3	339-338 | 1,3			
2°		1,7°	1,5°				
191-198 | 4,5		225-232 | 4,5	241-248 | 4,5				
198-207 | 4,5		232-241 | 4,5	248-257 | 4,5				
2,5°	2,2°		2°	1,2°			
190-198 | 7	216-234 | 7		240-248 | 7	310-318 | 7			
198-211 | 7	234-247 | 7		248-261 | 7	318-331 | 7			
0,5°							
178-184,6 | 1,5							
184,5-(200) | 1,5							
4°			3°				
178-198,4 | 17,1-20			229-248,4 | 17-20				
198,4-199 | 20			248,4-249 | 20				

~ bottom: uneven bottom _ bottom: flat bottom (...) max. diameter but no flat bottom

Subject to technical changes

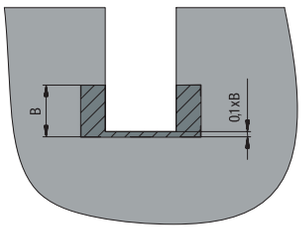
OPERATION INSTRUCTIONS

T-Slot Cutter



At normal machining conditions

Ensure good chip flow by means of strong coolant resp. compressed air supply!

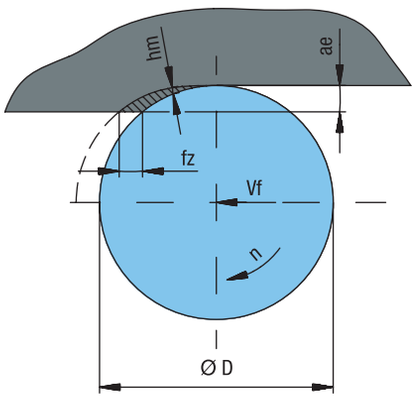


With low-powered machines

Ensure good chip flow by means of strong coolant resp. compressed air supply!

OPERATION INSTRUCTIONS

Slotting Cutter

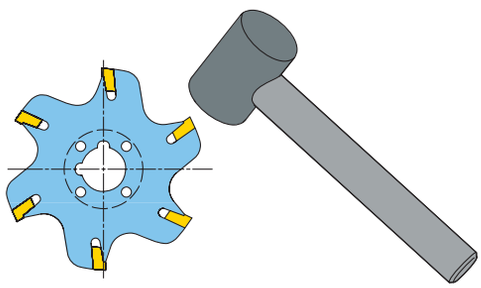


Depending on the cutting depth a_e the recommended feed rate must be corrected according to the following chart:

$\frac{a_e}{D}$	$\frac{1}{6}$	$\frac{1}{8}$	$\frac{1}{10}$	$\frac{1}{20}$
f_z	+15%	+30%	+45%	+100%

Cutting data

D: Cutter dia. (mm)
n: RPM (min^{-1})
V_f: Feed rate (mm/min)
V_c: Cutting speed (m/min)
a_e: Radial cutting depth (mm)
h_m: Average chip thickness (mm)
f_z: Feed per tooth (mm)
Z_{eff}: Number of effective teeth



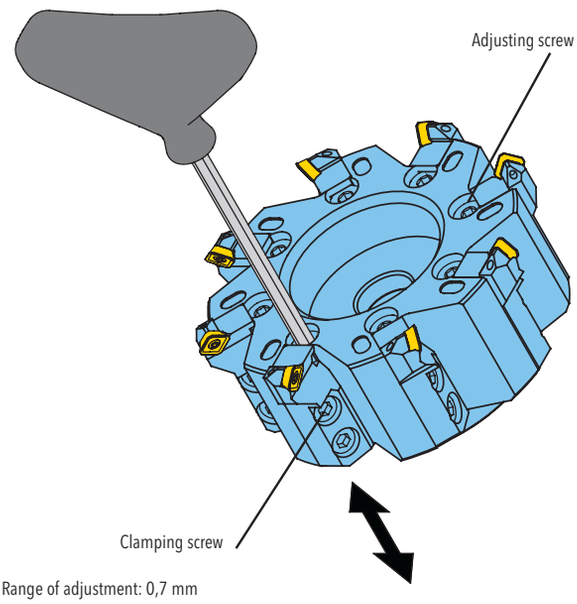
Mounting of inserts

Place inserts in their insert pockets, position them tightly to the back stop by tapping carefully with a plastic hammer.

Before the inserts are mounted, the insert pockets have to be cleansed from dust and chip residues.

OPERATION INSTRUCTIONS

Cartridge Mill 4W3A...

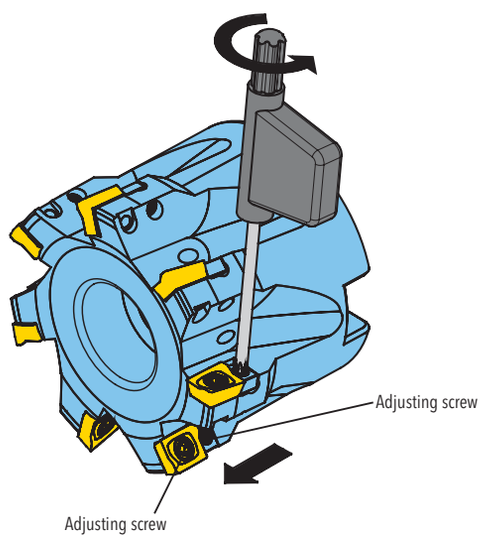


Range of adjustment: 0,7 mm

Assembly of cartridge mill

- Tighten adjusting screws.
- Insert cartridges and press to axial stop.
- Tighten clamping screws.
- Measure axial run-out of the cutter over the inserts and determine the highest insert (cartridge).
- Release clamping screw of the cartridge to be adjusted and tighten it slightly.
- Adjust all cartridges according to the highest measured value with the adjusting screw.
- Tighten clamping screws securely.

Square Shoulder Cutter 2J5M…



Adjustment of axial run-out

- Screw-in adjustment screws.
- Mount inserts and tighten the clamping screws.
- Measure axial run-out of the cutter and determine the insert with the highest position.
- Release clamping screw of the insert by ¼ turn.
- Adjust insert to the specified dimension by back-turning the adjustment screw.
- Tighten clamping screw.
- If necessary, adjust all other inserts likewise.

TIGHTENING TORQUE CHART – SCREWS FOR INDEXABLE INSERTS

Designation	D	L	Torx	Screw Driver	Tightening Torque	Tightening Torque Key	Blade
SM18-041-00	M1,8	4,10	TorxPlus 6	DS-TP06S	0,5 Nm	DTN005S	DS-TP06TB
SM20-043-00	M2	4,30	TorxPlus 6	DS-TP06S	0,7 Nm	DTNV01S (adjust to 0,7 Nm!)	DS-TP06TB
SM22-037-00	M2,2	3,70	Torx 7	DS-T07S	0,8 Nm	DTNV01S (adjust to 0,8 Nm!)	DS-T07TB
SM22-046-00	M2,2	4,60	Torx 7	DS-T07S	0,8 Nm	DTNV01S (adjust to 0,8 Nm!)	DS-T07TB
SM22-052-00	M2,2	5,20	Torx 7	DS-T07S	0,8 Nm	DTNV01S (adjust to 0,8 Nm!)	DS-T07TB
SM25-049-00	M2,5	4,85	Torx 8	DS-T08S	1,1 Nm	DTN011S	DS-T08TB
SM25-054-00	M2,5	5,35	Torx 8	DS-T08S	1,1 Nm	DTN011S	DS-T08TB
SM25-055-10	M2,5	5,20	Torx 8	DS-T08S	1,1 Nm	DTN011S	DS-T08TB
SM25-064-00	M2,5	6,40	Torx 8	DS-T08S	1,1 Nm	DTN011S	DS-T08TB
SM25-075-20	M2,5	7,50	Torx 8	DS-T08S	1,1 Nm	DTN011S	DS-T08TB
SM25-075-60	M2,5	7,50	TorxPlus 8	DS-TP08S	1,1 Nm	DTN011S	DS-TP08TB
SM30-053-00	M3	5,30	Torx 9	DS-T09S	2,0 Nm	DTN020S	DS-T09TB
SM30-065-00	M3	6,50	Torx 9	DS-T09S	2,0 Nm	DTN020S	DS-T09TB
SM30-082-00	M3	8,20	Torx 9	DS-T09S	2,0 Nm	DTN020S	DS-T09TB
SM30-082_B0	M3	8,20	Torx 10	DS-T10S	3,0 Nm	DTNV00S	DS-T10TB
SM35-034-50	M3,5	3,40	Torx 9	DS-T09S	2,0 Nm	DTN020S	DS-T09TB
SM35-042-50	M3,5	4,20	Torx 9	DS-T09S	2,0 Nm	DTN020S	DS-T09TB
SM35-088-10	M3,5	8,80	Torx 10	DS-T10S	3,0 Nm	DTNV00S (adjust to 3,0 Nm!)	DS-T10TB
SM35-088-60	M3,5	8,80	Torx 10	DS-T10S	3,0 Nm	DTNV00S (adjust to 3,0 Nm!)	DS-T10TB
SM40-050-50	M4	5,00	Torx 15	DS-T15S	4,5 Nm	DTNV00S (adjust to 4,5 Nm!)	DS-T15TB
SM40-060-00	M4	6,00	Torx 15	DS-T15S	4,5 Nm	DTNV00S (adjust to 4,5 Nm!)	DS-T15TB
SM40-060-50	M4	6,00	Torx 15	DS-T15S	4,5 Nm	DTNV00S (adjust to 4,5 Nm!)	DS-T15TB
SM40-070-00	M4	7,00	Torx 15	DS-T15S	4,5 Nm	DTNV00S (adjust to 4,5 Nm!)	DS-T15TB
SM40-078-20	M4	7,80	Torx 15	DS-T15S	4,5 Nm	DTNV00S (adjust to 4,5 Nm!)	DS-T15TB
SM40-080-00	M4	8,00	Torx 15	DS-T15S	4,5 Nm	DTNV00S (adjust to 4,5 Nm!)	DS-T15TB
SM40-080-10	M4	8,00	Torx 15	DS-T15S	4,5 Nm	DTNV00S (adjust to 4,5 Nm!)	DS-T15TB
SM40-080-30	M4	8,00	Torx 15	DS-T15S	4,5 Nm	DTNV00S (adjust to 4,5 Nm!)	DS-T15TB
SM40-080-50	M4	8,00	Torx 15	DS-T15S	4,5 Nm	DTNV00S (adjust to 4,5 Nm!)	DS-T15TB
SM40-090-00	M4	9,00	Torx 15	DS-T15S	4,5 Nm	DTNV00S (adjust to 4,5 Nm!)	DS-T15TB
SM40-090-20	M4	9,00	Torx 15	DS-T15S	4,5 Nm	DTNV00S (adjust to 4,5 Nm!)	DS-T15TB
SM40-093-20	M4	9,30	Torx 15	DS-T15S	4,5 Nm	DTNV00S (adjust to 4,5 Nm!)	DS-T15TB
SM40-100-00	M4	10,00	Torx 15	DS-T15S	4,5 Nm	DTNV00S (adjust to 4,5 Nm!)	DS-T15TB
SM40-100-10	M4	10,00	Torx 15	DS-T15S	4,5 Nm	DTNV00S (adjust to 4,5 Nm!)	DS-T15TB
SM40-106-B0	M4	10,00	TorxPlus 15	DS-T15S	4,5 Nm	DTNV00S (adjust to 4,5 Nm!)	DS-T15TB
SM40-110-00	M4	11,00	Torx 15	DS-T15S	4,5 Nm	DTNV00S (adjust to 4,5 Nm!)	DS-T15TB
SM40-120-20	M4	12,00	Torx 15	DS-T15S	4,5 Nm	DTNV00S (adjust to 4,5 Nm!)	DS-T15TB
SM40-130-00	M4	13,00	Torx 15	DS-T15S	4,5 Nm	DTNV00S (adjust to 4,5 Nm!)	DS-T15TB
SM50-096-20	M5	9,60	Torx 20	DS-T20S	6,0 Nm	DTNV00S (adjust to 6,0 Nm!)	DS-T20TB
SM50-100-00	M5	10,00	Torx 15	DS-T15S	6,0 Nm	DTNV00S (adjust to 6,0 Nm!)	DS-T15TB

TIGHTENING TORQUE CHART – SCREWS FOR INDEXABLE INSERTS

Designation	D	L	Torx	Screw Driver	Tightening Torque	Tightening Torque Key	Blade
SM50-100-10	M5	10,00	Torx 20	DS-T20S	6,0 Nm	DTNV00S (adjust to 6,0 Nm!)	DS-T20TB
SM50-108-20	M5	10,80	Torx 20	DS-T20S	6,0 Nm	DTNV00S (adjust to 6,0 Nm!)	DS-T20TB
SM50-120-00	M5	12,00	Torx 15	DS-T15S	6,0 Nm	DTNV00S (adjust to 6,0 Nm!)	DS-T15TB
SM50-120-10	M5	12,00	Torx 20	DS-T20S	6,0 Nm	DTNV00S (adjust to 6,0 Nm!)	DS-T15TB
SM50-120-30	M5	12,00	Torx 20	DS-T20T	7,5 Nm	DTNV00S (adjust to 7,5 Nm!)	DS-T20TB
SM50-122-50	M5	12,20	Torx 20	DS-T20S	7,5 Nm	DTNV00S (adjust to 7,5 Nm!)	DS-T20TB
SM50-138-B0	M5	13,80	Torx 15	WS-0060	6,0 Nm	DTNV00S (adjust to 6,0 Nm!)	DS-T20TB
SM50-140-00	M5	14,00	Torx 15	DS-T15S	6,0 Nm	DTNV00S (adjust to 6,0 Nm!)	DS-T15TB
SM50-160-00	M5	16,00	Torx 15	DS-T15S	6,0 Nm	DTNV00S (adjust to 6,0 Nm!)	DS-T15TB
SM50-160-10	M5	16,00	Torx 20	DS-T20S	6,0 Nm	DTNV00S (adjust to 6,0 Nm!)	DS-T20TB
SM50-190-00	M5	19,00	Torx 15	DS-T15S	6,0 Nm	DTNV00S (adjust to 6,0 Nm!)	DS-T15TB
SM50-190-10	M5	19,00	Torx 20	DS-T20S	6,0 Nm	DTNV00S (adjust to 6,0 Nm!)	DS-T20TB
SM60-165-B0	M6	16,50	Torx 20	WS-0060	6,0 Nm	DTNV00S (adjust to 6,0 Nm!)	DS-T20TB
SM70-210-B0	M7	21,00	Torx 20	WS-0062	10,0 Nm		
SM80-250-B0	M8	25,00	Torx 20	WS-0062	11,0 Nm		
SA-080-21	M8x1	16,00	SW4	DS-H04T	17,0 Nm		
SA-100-45	M10x1	25,00	SW5	DS-H05T	27,0 Nm		

Subject to technical changes

SURFACE FINISH COMPARISON CHART

	Surface Symbol (DIN 3141)	Roughness Grade No.	Surface Roughness R_a in µm	Arithm. Surface Roughness R_z in µm	Roughness (USA) CLA in µin	Roughness (France) R
Rough milling	▽	N 12	50	180...220	2000	–
	▽	N 11	25	90...110	1000	–
	▽	N 10	12,5	46...57	500	R 100
Finish milling	▽▽	N 9	6,3	23...32	250	R 40
	▽▽	N 8	3,2	12...16	125	R 25/R 16
	▽▽	N 7	1,6	5,90...8,00	63	R 10
Fine finishing	▽▽▽	N 6	0,8	3,00...4,80	32	R 6,3
	▽▽▽	N 5	0,4	1,60...2,80	16	R 3,2/R 2
	▽▽▽	N 4	0,2	1,00...1,80	8	R 1,25
Micro finishing	▽▽▽▽	N 3	0,1	0,80...1,10	4	R 0,8/R 0,5
	▽▽▽▽	N 2	0,05	0,45...0,60	2	–
	▽▽▽▽	N 1	0,025	0,22...0,30	1	–

Subject to technical changes

HARDNESS COMPARISON CHART (Extract of DIN 50 150)

Tensile Strength Rm N/mm²	Vickers Hardness HV	Brinell Hardness HB	Rockwell Hardness HRC
255	80	76,0	
270	85	80,7	
285	90	85,5	
305	95	90,2	
320	100	95,0	
335	105	99,8	
350	110	105	
370	115	109	
385	120	114	
400	125	119	
415	130	124	
430	135	128	
450	140	133	
465	145	138	
480	150	143	
495	155	147	
510	160	152	
530	165	156	
545	170	162	
560	175	166	
575	180	171	
595	185	176	
610	190	181	
625	195	185	
640	200	190	
660	205	195	
675	210	199	
690	215	204	
705	220	209	
720	225	214	
740	230	219	
755	235	223	
770	240	228	20,3
785	245	233	21,3
800	250	238	22,2
820	255	242	23,1
835	260	247	24,0
850	265	252	24,8
865	270	257	25,6
880	275	261	26,4
900	280	266	27,1
915	285	271	27,8
930	290	276	28,5
950	295	280	29,2
965	300	285	29,8
995	310	295	31,0
1030	320	304	32,2
1060	330	314	33,3
1095	340	323	34,4

Tensile Strength Rm N/mm²	Vickers Hardness HV	Brinell Hardness HB	Rockwell Hardness HRC
1125	350	333	35,5
1155	360	342	36,6
1190	370	352	37,7
1220	380	361	38,8
1255	390	371	39,8
1290	400	380	40,8
1320	410	390	41,8
1350	420	399	42,7
1385	430	409	43,6
1420	440	418	44,5
1455	450	428	45,3
1485	460	437	46,1
1520	470	447	46,9
1555	480	456	47,7
1595	490	466	48,4
1630	500	475	49,1
1665	510	485	49,8
1700	520	494	50,5
1740	530	504	51,1
1775	540	513	51,7
1810	550	523	52,3
1845	560	532	53,0
1880	570	542	53,6
1920	580	551	54,1
1955	590	561	54,7
1995	600	570	55,2
2030	610	580	55,7
2070	620	589	56,3
2105	630	599	56,8
2145	640	608	57,3
2180	650	618	57,8
	660		58,3
	670		58,8
	680		59,2
	690		59,7
	700		60,1
	720		61,0
	740		61,8
	760		62,5
	780		63,3
	800		64,0
	820		64,7
	840		65,3
	860		65,9
	880		66,4
	900		67,0
	920		67,5
	940		68,0

NOTES

GENERAL TECHNICAL INFORMATION

Order No.: 7810487

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