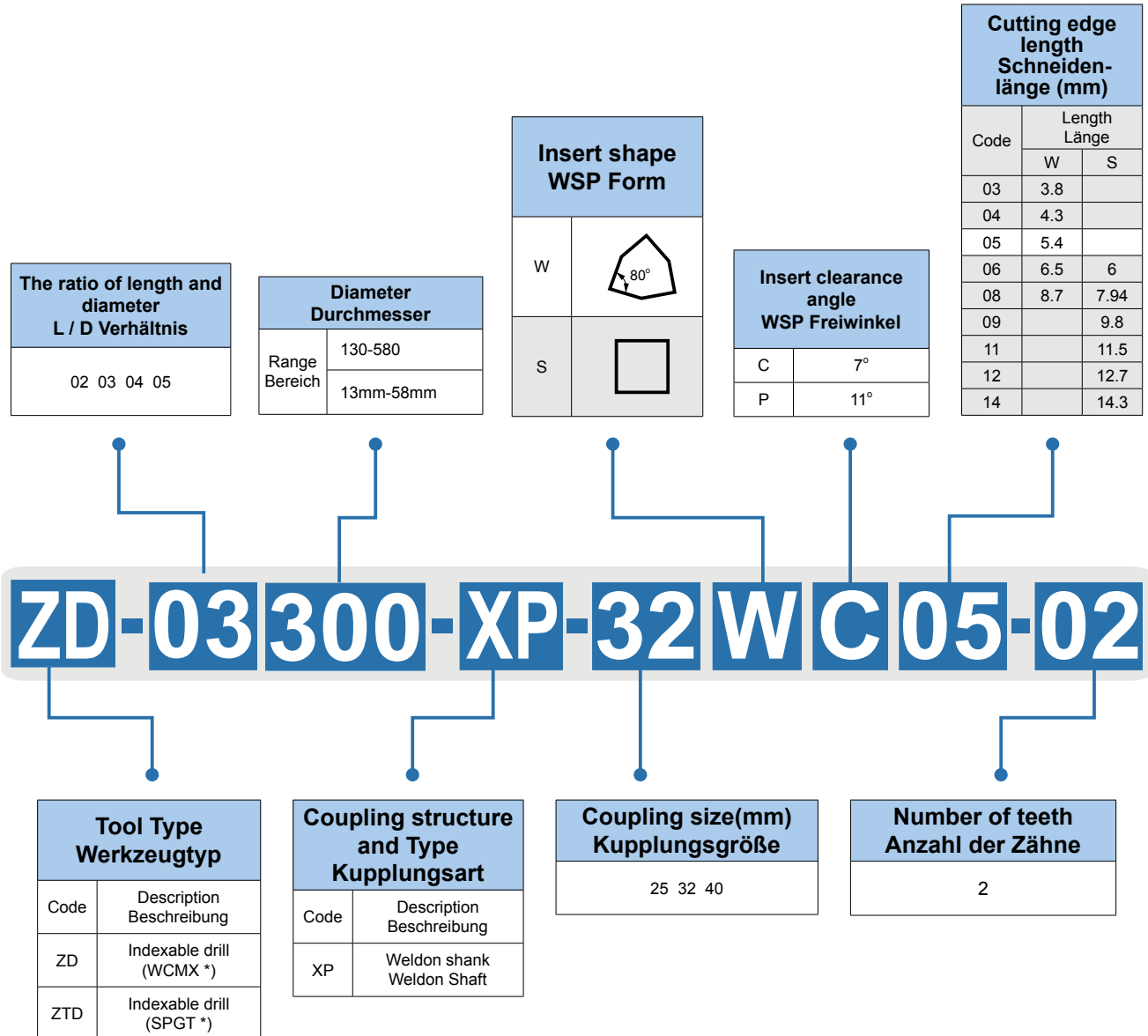


Indexable drill Code Key · ISO Kennzeichnung WSP- Bohrern



C

Indexable drills
WPS-Bohrer

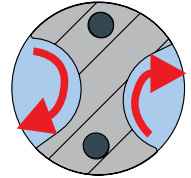
Drilling - Bohren

Indexable drill - Wendeschneidplattenbohrer

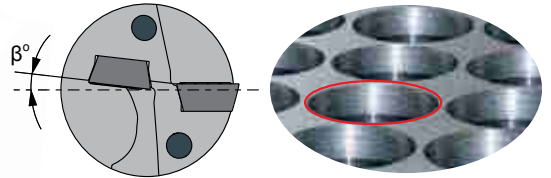
ZTD - Serie

Tool holder with excellent stiffness and special surface coating. For higher feed rate and higher productivity.
 Werkzeugträger mit exzellenter Torsionsteifigkeit und speziell beschichteter Oberfläche, ermöglicht höhere Vorschübe und Produktivität

Big chip pocket for better chip removal
 Größer Spanraum für optimalen Spanabfluß



Optimised insert seat and clamping. Less vibration and higher tool life.
 Optimierter Plattensitz und optimierte Plattenklemmung für vibrationsfreie Bearbeitung mit hohen Standzeiten



Double helix internal cooling for more effective cooling and good chip removal, also in deep hole boring.
 Innenkühlung mit Doppelhelixdesign für effektivere Kühlmittelzufuhr und Spanabfluß speziell bei tieferen Bohrungen.

Example - Beispiel

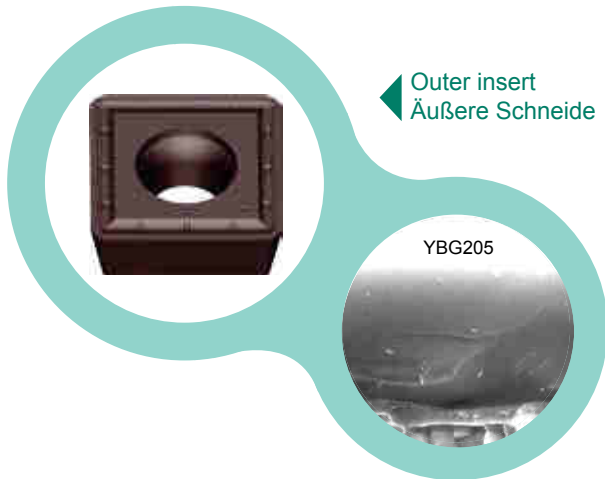
Type Typ	ZTD04-260-XP25-SP07-02 SPGT07T308-PM / YBG205 (outer insert / Außenschneide) SPGT07T308-PM / YBG212 (inner insert / Innenschneide)	Comparison Vergleich	<p>Number of drilling Anzahl Bohrungen</p> <p>ZTD04 Competitor A Wettbewerb A</p>
Workpiece Werkstückstoff	50Mn(HB240)		
Cooling system Kühlsystem	Doublehelix internal cooling Doppelhelix-Innenkühlung		
Cutting data Schnittdaten	$V_c=130\text{m/min}$ $f=210\text{mm/min}$ $a_p=90\text{mm}$		
Results Ergebnis		Chips Spanbildung	<p>ZTD04-260-XP25-SP07-02 Competitor A Wettbewerb A</p>

C

Indexable drills
WPS-Bohrer

ZTD-Serie

Optimised edge design for stable operation with new chip breaker design / *Optimierte Schneidkante, stabile Bearbeitung, neuartiger Spanbrecher*
 Special grades for outer and inner insert for more efficiency in different material / *Optimierte Sorten für Innen- und Außenschneide für höhere Effizienz bei vielen Materialien*



YBG205

New nano coating structure with good hardness and wear resistance, but also good toughness. Ultra fine surface design prevent friction for best chip flow. Excellent thermal and chemical wear resistance. Best choice for all material also for stainless steel and high alloy material.

Neue Nano-Beschichtungsstruktur mit gleichzeitiger Härte und Verschleißfestigkeit bzw. Zähigkeit. Eine ultra glatte Schichtoberfläche vermindert die Reibung und garantiert einen optimierten Spanabfluß. Die exzellente thermische und chemische Widerstandsfähigkeit zeigt diese Sorte besonders bei der Bearbeitung von rostfreien Stählen und warmfesten Legierungen.

YBG212

Special Nano TiAlN coating with smooth surface for less friction and better chipflow / *Spezielle Nano TiAlN Beschichtung mit sehr glatter Oberfläche für weniger Reibung und besseren Spanablauf*




In combination with super fine grain size substrate good balance between wear resistance and toughness / *In Verbindung mit neuem Superfeinkorn-Substrat die ideale Kombination aus Verschleißfestigkeit und Zähigkeit*

Excellent thermal and oxidation resistance for more stable edge / *Mit sehr guter Temperatur- und Oxidationsbeständigkeit für optimalen Schneidkantenschutz*

For boring operation the cutting speed at inner insert is lower. Therefore the grade must be more tough to prevent breakage. YBG212 is best choice in that case. YBG205 is excellent for higher wear resistance.

Bei der Bohrbearbeitung ist die Schnittgeschwindigkeit an der Innenschneide niedriger als an der Außenschneide. Mit solch ungünstigen Bearbeitungsbedingungen sollte die Innenschneide eine höhere Zähigkeit haben. Hier ist die YBG212 optimal einzusetzen. Die Außenplatte hat mit der YBG205 eine höhere Verschleißfestigkeit.

Example · Beispiel

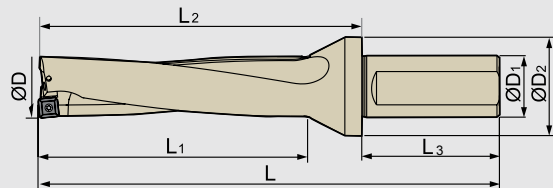
		Cooling system Kühlsystem	Doublehelix Internal cooling Doppelhelix-Innenkühlung	
		Type Typ	ZTD04-240-XP25-SP07-02 SPGT07T308-PM/YBG205 (outer insert / Außenschneide) SPGT07T308-PM/YBG212 (inner insert / Innenschneide)	Competitor A Wettbewerb A
Workpiece Werkstückstoff	42CrMo(HRC25)	Compare Vergleich		
Cutting data Schnittdaten	$V_c=150\text{m/min}$ $f_r=0.12\text{mm}/\mu$ $a_p=80\text{mm}$	(after 15 min / nach 15 min)		

Drilling · Bohren

Indexable drill · Wendeschneidplattenbohrer

ZTD02

2D

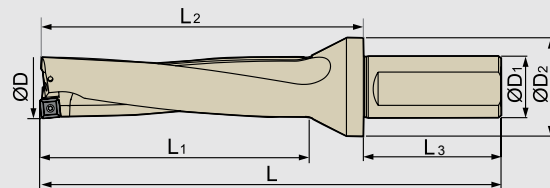


Type Typ	Stock Lager	Dimension Abmessung (mm)							Insert WSP	Screw Schraube	Wrench Schlüssel
		ØD	ØD ₁	ØD ₂	L ₃	L ₂	L ₁	L			
ZTD02-130-XP20-SP05-02	●	13	20	25	50	47	32	97	SPGT050204-PM/EM	160M2X4.3	WT06IP
ZTD02-140-XP20-SP05-02	●	14	20	25	50	49	34	99	SPGT050204-PM/EM	160M2X4.3	WT06IP
ZTD02-150-XP20-SP05-02	●	15	20	25	50	51	36	101	SPGT050204-PM/EM	160M2X4.3	WT06IP
ZTD02-160-XP20-SP05-02	●	16	20	25	50	53	38	103	SPGT050204-PM/EM	160M2X4.3	WT06IP
ZTD02-170-XP25-SP06-02	●	17	25	32	56	62	40	118	SPGT060204-PM/EM	160M2.2X5.5	WT07IP
ZTD02-180-XP25-SP06-02	●	18	25	32	56	64	42	120	SPGT060204-PM/EM	160M2.2X5.5	WT07IP
ZTD02-190-XP25-SP06-02	●	19	25	32	56	66	44	122	SPGT060204-PM/EM	160M2.2X5.5	WT07IP
ZTD02-200-XP25-SP06-02	●	20	25	32	56	68	46	124	SPGT060204-PM/EM	160M2.2X5.5	WT07IP
ZTD02-210-XP25-SP06-02	●	21	25	32	56	70	48	126	SPGT060204-PM/EM	160M2.2X5.5	WT07IP
ZTD02-220-XP25-SP07-02	●	22	25	32	56	72	50	128	SPGT07T308-PM/EM	160M2.5X6.5	WT07IP
ZTD02-230-XP25-SP07-02	●	23	25	32	56	74	52	130	SPGT07T308-PM/EM	160M2.5X6.5	WT07IP
ZTD02-240-XP25-SP07-02	●	24	25	32	56	76	54	132	SPGT07T308-PM/EM	160M2.5X6.5	WT07IP
ZTD02-250-XP25-SP07-02	●	25	25	32	56	78	56	134	SPGT07T308-PM/EM	160M2.5X6.5	WT07IP
ZTD02-260-XP25-SP07-02	●	26	25	32	56	80	58	136	SPGT07T308-PM/EM	160M2.5X6.5	WT07IP
ZTD02-270-XP25-SP07-02	●	27	25	32	56	82	60	138	SPGT07T308-PM/EM	160M2.5X6.5	WT07IP
ZTD02-280-XP32-SP09-02	●	28	32	37	60	87	62	147	SPGT090408-PM/EM	160M3.5X8	WT15IP
ZTD02-290-XP32-SP09-02	●	29	32	37	60	89	64	149	SPGT090408-PM/EM	160M3.5X8	WT15IP
ZTD02-300-XP32-SP09-02	●	30	32	37	60	91	66	151	SPGT090408-PM/EM	160M3.5X8	WT15IP
ZTD02-310-XP32-SP09-02	●	31	32	37	60	93	68	153	SPGT090408-PM/EM	160M3.5X8	WT15IP
ZTD02-320-XP32-SP09-02	●	32	32	37	60	95	70	155	SPGT090408-PM/EM	160M3.5X8	WT15IP
ZTD02-330-XP32-SP09-02	●	33	32	37	60	97	72	157	SPGT090408-PM/EM	160M3.5X8	WT15IP
ZTD02-340-XP40-SP11-02	●	34	40	47	70	104	74	174	SPGT110408-PM/EM	160M4X10	WT15IP
ZTD02-350-XP40-SP11-02	●	35	40	47	70	106	76	176	SPGT110408-PM/EM	160M4X10	WT15IP
ZTD02-360-XP40-SP11-02	●	36	40	47	70	108	78	178	SPGT110408-PM/EM	160M4X10	WT15IP
ZTD02-370-XP40-SP11-02	●	37	40	47	70	110	80	180	SPGT110408-PM/EM	160M4X10	WT15IP
ZTD02-380-XP40-SP11-02	●	38	40	47	70	112	82	182	SPGT110408-PM/EM	160M4X10	WT15IP
ZTD02-390-XP40-SP11-02	●	39	40	47	70	114	84	184	SPGT110408-PM/EM	160M4X10	WT15IP
ZTD02-400-XP40-SP11-02	●	40	40	47	70	116	86	186	SPGT110408-PM/EM	160M4X10	WT15IP
ZTD02-410-XP40-SP11-02	●	41	40	47	70	118	88	188	SPGT110408-PM/EM	160M4X10	WT15IP
ZTD02-420-XP40-SP14-02	●	42	40	52	70	130	90	200	SPGT140512-PM/EM	160M5X13	WT20IP
ZTD02-430-XP40-SP14-02	●	43	40	52	70	132	92	202	SPGT140512-PM/EM	160M5X13	WT20IP
ZTD02-440-XP40-SP14-02	●	44	40	52	70	134	94	204	SPGT140512-PM/EM	160M5X13	WT20IP
ZTD02-450-XP40-SP14-02	●	45	40	52	70	136	96	206	SPGT140512-PM/EM	160M5X13	WT20IP
ZTD02-460-XP40-SP14-02	●	46	40	52	70	138	98	208	SPGT140512-PM/EM	160M5X13	WT20IP
ZTD02-470-XP40-SP14-02	●	47	40	52	70	140	100	210	SPGT140512-PM/EM	160M5X13	WT20IP
ZTD02-480-XP40-SP14-02	●	48	40	52	70	142	102	212	SPGT140512-PM/EM	160M5X13	WT20IP
ZTD02-490-XP40-SP14-02	●	49	40	52	70	144	104	214	SPGT140512-PM/EM	160M5X13	WT20IP
ZTD02-500-XP40-SP14-02	●	50	40	52	70	146	106	216	SPGT140512-PM/EM	160M5X13	WT20IP

● Ex Stock / ab Lager ○ On demand / auf Anfrage

ZTD03

3D



Type Typ	Stock Lager	Dimension Abmessung (mm)							Insert WSP	Screw Schraube	Wrench Schlüssel
		ØD	ØD ₁	ØD ₂	L ₃	L ₂	L ₁	L			
ZTD03-130-XP20-SP05-02	●	13	20	25	50	67	44	111	SPGT050204-PM/PE	I60M2.0×4.3	WT06IP
ZTD03-140-XP20-SP05-02	●	14	20	25	50	67	47	114	SPGT050204-PM/PE	I60M2.0×4.3	WT06IP
ZTD03-150-XP20-SP05-02	●	15	20	25	50	64	50	114	SPGT050204-PM/PE	I60M2.0×4.3	WT06IP
ZTD03-160-XP20-SP05-02	●	16	20	25	50	67	53	120	SPGT050204-PM/PE	I60M2.0×4.3	WT06IP
ZTD03-170-XP25-SP06-02	●	17	25	32	56	79	56	135	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP
ZTD03-180-XP25-SP06-02	●	18	25	32	56	82	59	138	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP
ZTD03-190-XP25-SP06-02	●	19	25	32	56	84	62	140	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP
ZTD03-200-XP25-SP06-02	●	20	25	32	56	87	65	143	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP
ZTD03-210-XP25-SP06-02	●	21	25	32	56	90	68	146	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP
ZTD03-220-XP25-SP06-02	●	22	25	32	56	93	71	149	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP
ZTD03-230-XP25-SP07-02	●	23	25	40	56	96	74	153	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP
ZTD03-240-XP25-SP07-02	●	24	25	40	56	102	77	159	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP
ZTD03-250-XP25-SP07-02	●	25	25	40	56	102	80	159	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP
ZTD03-260-XP25-SP07-02	●	26	25	40	56	105	83	162	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP
ZTD03-270-XP25-SP07-02	●	27	25	40	56	108	86	165	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP
ZTD03-280-XP25-SP07-02	●	28	25	40	56	111	89	168	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP
ZTD03-290-XP32-SP07-02	●	29	32	45	60	117	92	178	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP
ZTD03-300-XP32-SP09-02	●	30	32	45	60	120	95	181	SPGT090408-PM/EM	I60M3.5×8	WT15IP
ZTD03-310-XP32-SP09-02	●	31	32	45	60	123	98	184	SPGT090408-PM/EM	I60M3.5×8	WT15IP
ZTD03-320-XP32-SP09-02	●	32	32	45	60	126	101	187	SPGT090408-PM/EM	I60M3.5×8	WT15IP
ZTD03-330-XP32-SP09-02	●	33	32	45	60	129	104	190	SPGT090408-PM/EM	I60M3.5×8	WT15IP
ZTD03-340-XP32-SP09-02	●	34	32	45	60	132	107	193	SPGT090408-PM/EM	I60M3.5×8	WT15IP
ZTD03-350-XP32-SP09-02	●	35	32	45	60	135	110	196	SPGT090408-PM/EM	I60M3.5×8	WT15IP
ZTD03-360-XP32-SP09-02	●	36	32	45	60	138	113	199	SPGT090408-PM/EM	I60M3.5×8	WT15IP
ZTD03-370-XP40-SP11-02	●	37	40	55	70	147	117	217	SPGT110408-PM/EM	I60M4×10	WT15IP
ZTD03-380-XP40-SP11-02	●	38	40	55	70	150	119	220	SPGT110408-PM/EM	I60M4×10	WT15IP
ZTD03-390-XP40-SP11-02	●	39	40	55	70	153	122	223	SPGT110408-PM/EM	I60M4×10	WT15IP
ZTD03-400-XP40-SP11-02	●	40	40	55	70	160	125	231	SPGT110408-PM/EM	I60M4×10	WT15IP
ZTD03-410-XP40-SP11-02	●	41	40	55	70	158	128	229	SPGT110408-PM/EM	I60M4×10	WT15IP
ZTD03-420-XP40-SP11-02	●	42	40	55	70	161	131	232	SPGT110408-PM/EM	I60M4×10	WT15IP
ZTD03-430-XP40-SP11-02	●	43	40	55	70	169	134	240	SPGT110408-PM/EM	I60M4×10	WT15IP
ZTD03-440-XP40-SP14-02	●	44	40	60	70	178	138	248	SPGT140512-PM/EM	I60M5×13	WT20IP
ZTD03-450-XP40-SP14-02	●	45	40	60	70	181	141	251	SPGT140512-PM/EM	I60M5×13	WT20IP
ZTD03-460-XP40-SP14-02	●	46	40	60	70	184	144	254	SPGT140512-PM/EM	I60M5×13	WT20IP
ZTD03-470-XP40-SP14-02	●	47	40	60	70	187	147	257	SPGT140512-PM/EM	I60M5×13	WT20IP
ZTD03-480-XP40-SP14-02	●	48	40	60	70	189	149	260	SPGT140512-PM/EM	I60M5×13	WT20IP
ZTD03-490-XP40-SP14-02	●	49	40	60	70	192	152	263	SPGT140512-PM/EM	I60M5×13	WT20IP
ZTD03-500-XP40-SP14-02	●	50	40	60	70	195	155	266	SPGT140512-PM/EM	I60M5×13	WT20IP

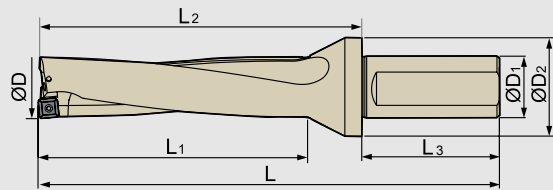




Drilling - Bohren

Indexable drill - Wendeschneidplattenbohrer

ZTD04

4D



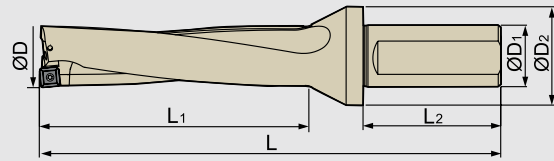
Type Typ	Stock Lager	Dimension Abmessung (mm)							Insert WSP	Screw Schraube 	Wrench Schlüssel 
		ØD	ØD1	ØD2	L3	L2	L1	L			
ZTD04-130-XP20-SP05-02	○	13	20	25	50	74	57	124	SPGT050204-PM/EM	I60M2.0×4.3	WT06IP
ZTD04-140-XP20-SP05-02	●	14	20	25	50	78	61	128	SPGT050204-PM/EM	I60M2.0×4.3	WT06IP
ZTD04-150-XP20-SP05-02	●	15	20	25	50	82	65	132	SPGT050204-PM/EM	I60M2.0×4.3	WT06IP
ZTD04-160-XP20-SP05-02	●	16	20	25	50	86	69	136	SPGT050204-PM/EM	I60M2.0×4.3	WT06IP
ZTD04-170-XP25-SP06-02	●	17	25	32	56	95	73	152	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP
ZTD04-180-XP25-SP06-02	●	18	25	32	56	99	77	156	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP
ZTD04-190-XP25-SP06-02	●	19	25	32	56	103	81	160	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP
ZTD04-200-XP25-SP06-02	●	20	25	32	56	107	85	163	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP
ZTD04-210-XP25-SP06-02	●	21	25	32	56	111	89	167	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP
ZTD04-220-XP25-SP06-02	●	22	25	32	56	115	93	171	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP
ZTD04-230-XP25-SP07-02	●	23	25	40	56	119	97	176	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP
ZTD04-240-XP25-SP07-02	●	24	25	40	56	123	101	180	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP
ZTD04-250-XP25-SP07-02	●	25	25	40	56	127	105	184	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP
ZTD04-260-XP25-SP07-02	●	26	25	40	56	131	109	188	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP
ZTD04-270-XP25-SP07-02	●	27	25	40	56	135	113	192	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP
ZTD04-280-XP25-SP07-02	●	28	32	45	60	143	118	203	SPGT070408-PM/EM	I60M2.5×6.5	WT07IP
ZTD04-290-XP32-SP07-02	●	29	32	45	60	146	121	207	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP
ZTD04-300-XP32-SP09-02	●	30	32	45	60	150	125	211	SPGT090408-PM/EM	I60M3.5×8	WT15IP
ZTD04-310-XP32-SP09-02	●	31	32	45	60	154	129	215	SPGT090408-PM/EM	I60M3.5×8	WT15IP
ZTD04-320-XP32-SP09-02	●	32	32	45	60	158	133	219	SPGT090408-PM/EM	I60M3.5×8	WT15IP
ZTD04-330-XP32-SP09-02	●	33	32	45	60	162	137	223	SPGT090408-PM/EM	I60M3.5×8	WT15IP
ZTD04-340-XP32-SP09-02	●	34	32	45	60	166	141	227	SPGT090408-PM/EM	I60M3.5×8	WT15IP
ZTD04-350-XP32-SP09-02	●	35	32	45	60	170	145	231	SPGT090408-PM/EM	I60M3.5×8	WT15IP
ZTD04-360-XP32-SP09-02	●	36	32	45	60	174	149	235	SPGT090408-PM/EM	I60M3.5×8	WT15IP
ZTD04-370-XP40-SP11-02	●	37	40	55	70	184	154	254	SPGT110408-PM/EM	I60M4×10	WT15IP
ZTD04-380-XP40-SP11-02	●	38	40	55	70	188	158	258	SPGT110408-PM/EM	I60M4×10	WT15IP
ZTD04-390-XP40-SP11-02	●	39	40	55	70	196	161	267	SPGT110408-PM/EM	I60M4×10	WT15IP
ZTD04-400-XP40-SP11-02	●	40	40	55	70	200	165	271	SPGT110408-PM/EM	I60M4×10	WT15IP
ZTD04-410-XP40-SP11-02	●	41	40	55	70	199	169	270	SPGT110408-PM/EM	I60M4×10	WT15IP
ZTD04-420-XP40-SP11-02	●	42	40	55	70	208	173	279	SPGT110408-PM/EM	I60M4×10	WT15IP
ZTD04-430-XP40-SP11-02	●	43	40	55	70	212	177	283	SPGT110408-PM/EM	I60M4×10	WT15IP
ZTD04-440-XP40-SP14-02	●	44	40	60	70	222	182	292	SPGT140512-PM/EM	I60M5×13	WT20IP
ZTD04-450-XP40-SP14-02	●	45	40	60	70	226	186	296	SPGT140512-PM/EM	I60M5×13	WT20IP
ZTD04-460-XP40-SP14-02	●	46	40	60	70	230	190	300	SPGT140512-PM/EM	I60M5×13	WT20IP
ZTD04-470-XP40-SP14-02	●	47	40	60	70	234	194	304	SPGT140512-PM/EM	I60M5×13	WT20IP
ZTD04-480-XP40-SP14-02	●	48	40	60	70	237	198	308	SPGT140512-PM/EM	I60M5×13	WT20IP
ZTD04-490-XP40-SP14-02	●	49	40	60	70	241	202	312	SPGT140512-PM/EM	I60M5×13	WT20IP
ZTD04-500-XP40-SP14-02	●	50	40	60	70	245	206	316	SPGT140512-PM/EM	I60M5×13	WT20IP



Indexable drills
WPS-Bohrer

ZTD05

5D



Type Typ	Stock Lager	Dimension Abmessung (mm)						Insert WSP	Screw Schraube	Wrench Schlüssel
		ØD	ØD ₁	ØD ₂	L ₁	L ₂	L			
ZTD05-170-XP25-SP06-02	●	17	25	32	91	56	169	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP
ZTD05-180-XP25-SP06-02	●	18	25	32	96	56	174	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP
ZTD05-190-XP25-SP06-02	●	19	25	32	101	56	179	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP
ZTD05-200-XP25-SP06-02	●	20	25	32	106	56	184	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP
ZTD05-210-XP25-SP06-02	●	21	25	32	111	56	189	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP
ZTD05-220-XP25-SP07-02	●	22	25	32	115	56	194	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP
ZTD05-230-XP25-SP07-02	●	23	25	32	120	56	199	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP
ZTD05-240-XP25-SP07-02	●	24	25	32	125	56	204	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP
ZTD05-250-XP25-SP07-02	●	25	25	32	130	56	209	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP
ZTD05-260-XP25-SP07-02	●	26	25	32	135	56	214	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP
ZTD05-270-XP25-SP07-02	●	27	25	32	140	56	219	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP
ZTD05-280-XP32-SP09-02	●	28	32	37	145	60	231	SPGT090408-PM/EM	I60M3.5×8	WT15IP
ZTD05-290-XP32-SP09-02	●	29	32	37	150	60	236	SPGT090408-PM/EM	I60M3.5×8	WT15IP
ZTD05-300-XP32-SP09-02	●	30	32	37	155	60	241	SPGT090408-PM/EM	I60M3.5×8	WT15IP
ZTD05-310-XP32-SP09-02	●	31	32	37	160	60	246	SPGT090408-PM/EM	I60M3.5×8	WT15IP
ZTD05-320-XP32-SP09-02	●	32	32	37	165	60	251	SPGT090408-PM/EM	I60M3.5×8	WT15IP
ZTD05-330-XP32-SP09-02	●	33	32	37	170	60	256	SPGT090408-PM/EM	I60M3.5×8	WT15IP
ZTD05-340-XP40-SP11-02	●	34	40	47	176	70	276	SPGT110408-PM/EM	I60M4×10	WT15IP
ZTD05-350-XP40-SP11-02	●	35	40	47	181	70	281	SPGT110408-PM/EM	I60M4×10	WT15IP
ZTD05-360-XP40-SP11-02	●	36	40	47	186	70	286	SPGT110408-PM/EM	I60M4×10	WT15IP
ZTD05-370-XP40-SP11-02	●	37	40	47	191	70	291	SPGT110408-PM/EM	I60M4×10	WT15IP
ZTD05-380-XP40-SP11-02	●	38	40	47	196	70	296	SPGT110408-PM/EM	I60M4×10	WT15IP
ZTD05-390-XP40-SP11-02	●	39	40	47	201	70	301	SPGT110408-PM/EM	I60M4×10	WT15IP
ZTD05-400-XP40-SP11-02	●	40	40	47	206	70	306	SPGT110408-PM/EM	I60M4×10	WT15IP
ZTD05-410-XP40-SP11-02	○	41	40	47	211	70	311	SPGT110408-PM/EM	I60M4×10	WT15IP
ZTD05-420-XP40-SP14-02	○	42	40	52	216	70	326	SPGT140512-PM/EM	I60M5×13	WT20IP
ZTD05-430-XP40-SP14-02	○	43	40	52	221	70	331	SPGT140512-PM/EM	I60M5×13	WT20IP
ZTD05-440-XP40-SP14-02	○	44	40	52	226	70	336	SPGT140512-PM/EM	I60M5×13	WT20IP
ZTD05-450-XP40-SP14-02	○	45	40	52	231	70	342	SPGT140512-PM/EM	I60M5×13	WT20IP
ZTD05-460-XP40-SP14-02	○	46	40	52	236	70	346	SPGT140512-PM/EM	I60M5×13	WT20IP
ZTD05-470-XP40-SP14-02	○	47	40	52	241	70	351	SPGT140512-PM/EM	I60M5×13	WT20IP
ZTD05-480-XP40-SP14-02	○	48	40	52	246	70	356	SPGT140512-PM/EM	I60M5×13	WT20IP
ZTD05-490-XP40-SP14-02	○	49	40	52	251	70	361	SPGT140512-PM/EM	I60M5×13	WT20IP
ZTD05-500-XP40-SP14-02	○	50	40	52	256	70	366	SPGT140512-PM/EM	I60M5×13	WT20IP

● Ex Stock / ab Lager ○ On demand / auf Anfrage

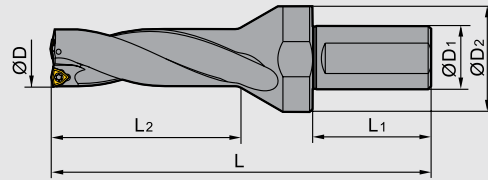
C

Indexable drills
WPS-Bohrer

Drilling · Bohren

Indexable drill · Wendeschneidplattenbohrer

ZD03



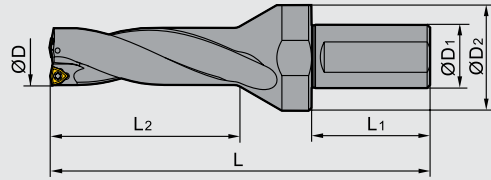
Type Typ	Stock Lager	Basic dimension(mm) Abmessungen						Inserts WSP	Screw Schraube	Wrench Schlüssel
		D	D ₁	D ₂	L ₁	L ₂	L			
ZD03-160-XP25-WC03-02	●	16	25	32	56	52	129	WCMX030208	I60M2.5×6.5	WT07IP
ZD03-170-XP25-WC03-02	●	17	25	32	56	55	133	WCMX030208	I60M2.5×6.5	WT07IP
ZD03-180-XP25-WC03-02	●	18	25	32	56	58	137	WCMX030208	I60M2.5×6.5	WT07IP
ZD03-190-XP25-WC03-02	●	19	25	32	56	61	140	WCMX030208	I60M2.5×6.5	WT07IP
ZD03-200-XP25-WC03-02	●	20	25	32	56	64	143	WCMX030208	I60M2.5×6.5	WT07IP
ZD03-210-XP25-WC04-02	●	21	25	45	56	67	153	WCMX040208	I60M2.5×6.5T	WT08IP
ZD03-220-XP25-WC04-02	●	22	25	45	56	70	156	WCMX040208	I60M2.5×6.5T	WT08IP
ZD03-230-XP25-WC04-02	●	23	25	45	56	73	159	WCMX040208	I60M2.5×6.5T	WT08IP
ZD03-240-XP25-WC04-02	●	24	25	45	56	76	162	WCMX040208	I60M2.5×6.5T	WT08IP
ZD03-250-XP25-WC04-02	●	25	25	45	56	79	165	WCMX040208	I60M2.5×6.5T	WT08IP
ZD03-260-XP32-WC05-02	●	26	32	55	60	83	176	WCMX050308	I60M3×7	WT09IP
ZD03-270-XP32-WC05-02	●	27	32	55	60	86	180	WCMX050308	I60M3×7	WT09IP
ZD03-280-XP32-WC05-02	●	28	32	55	60	89	184	WCMX050308	I60M3×7	WT09IP
ZD03-290-XP32-WC05-02	●	29	32	55	60	92	188	WCMX050308	I60M3×7	WT09IP
ZD03-300-XP32-WC05-02	●	30	32	55	60	95	192	WCMX050308	I60M3×7	WT09IP
ZD03-310-XP40-WC06-02	●	31	40	60	70	98	203	WCMX06T308	I60M3×7	WT09IP
ZD03-320-XP40-WC06-02	●	32	40	60	70	101	206	WCMX06T308	I60M3×7	WT09IP
ZD03-330-XP40-WC06-02	●	33	40	60	70	104	209	WCMX06T308	I60M3×7	WT09IP
ZD03-340-XP40-WC06-02	●	34	40	60	70	107	212	WCMX06T308	I60M3×7	WT09IP
ZD03-350-XP40-WC06-02	●	35	40	60	70	110	215	WCMX06T308	I60M3×7	WT09IP
ZD03-360-XP40-WC06-02	●	36	40	60	70	113	218	WCMX06T308	I60M3×7	WT09IP
ZD03-370-XP40-WC06-02	●	37	40	60	70	116	221	WCMX06T308	I60M3×7	WT09IP
ZD03-380-XP40-WC06-02	●	38	40	60	70	119	225	WCMX06T308	I60M3×7	WT09IP
ZD03-390-XP40-WC06-02	●	39	40	60	70	122	228	WCMX06T308	I60M3×7	WT09IP

● Ex Stock / ab Lager ○ On demand / auf Anfrage



Indexable drills
WPS-Bohrer

ZD03



Type Typ	Stock Lager	Basic dimension(mm) Abmessungen						Inserts WSP	Screw Schraube	Wrench Schlüssel
		D	D1	D2	L1	L2	L			
ZD03-400-XP40-WC06-02	●	40	40	60	70	125	231	WCMX06T308	I60M3×7	WT09IP
ZD03-410-XP40-WC06-02	●	41	40	60	70	128	234	WCMX06T308	I60M3×7	WT09IP
ZD03-420-XP40-WC08-02	●	42	40	60	70	131	239	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-430-XP40-WC08-02	●	43	40	60	70	134	242	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-440-XP40-WC08-02	●	44	40	60	70	137	245	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-450-XP40-WC08-02	●	45	40	60	70	140	248	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-460-XP40-WC08-02	●	46	40	60	70	143	251	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-470-XP40-WC08-02	●	47	40	60	70	146	253	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-480-XP40-WC08-02	●	48	40	70	70	149	255	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-490-XP40-WC08-02	○	49	40	70	70	152	257	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-500-XP40-WC08-02	●	50	40	70	70	155	259	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-510-XP40-WC08-02	●	51	40	70	70	158	261	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-520-XP40-WC08-02	○	52	40	70	70	161	263	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-530-XP40-WC08-02	○	53	40	70	70	164	265	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-540-XP40-WC08-02	●	54	40	70	70	167	267	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-550-XP40-WC08-02	○	55	40	70	70	170	269	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-560-XP40-WC08-02	○	56	40	70	70	173	271	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-570-XP40-WC08-02	○	57	40	70	70	176	273	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-580-XP40-WC08-02	●	58	40	70	70	179	275	WCMX080412	I60M3.5×10.4	WT15IP



Drilling - Bohren

Indexable drill - Wendeschneidplattenbohrer

Inserts Drills Code Key - ISO Kennzeichnung Wendeschneidplatten

Insert shape · Plattenform	
Code	Insert shap Plattenform
S	
W	

Tolerance · Toleranz							
Code	m Tolerance(mm) Toleranz	ØI.C Tolerance(mm) Toleranz	S Tolerance(mm) Toleranz	Code	m Tolerance(mm) Toleranz	ØI.C Tolerance(mm) Toleranz	S Tolerance(mm) Toleranz
A	±0.005	±0.025	±0.025	J	±0.005	±0.05-±0.13	±0.025
F	±0.005	±0.013	±0.025	K	±0.013	±0.05-±0.13	±0.025
C	±0.013	±0.025	±0.025	L	±0.025	±0.05-±0.13	±0.025
H	±0.013	±0.013	±0.025	M	±0.08-±0.18	±0.05-±0.13	±0.13
E	±0.025	±0.025	±0.025	N	±0.08-±0.18	±0.05-±0.13	±0.025
G	±0.025	±0.025	±0.13	U	±0.13-±0.38	±0.08-±0.25	±0.13

W C M X

Clearance angle of main cutting edge Freiwinkel der Hauptschneide			
Code	Clearance angle Freiwinkel	Code	Clearance angle Freiwinkel
A	3°	B	5°
C	7°	D	15°
E	20°	F	25°
G	30°	N	0°
P	11°	O	Other clearance angle Anderer Freiwinkel

Chipbreaker and clamping system Spanformstufen und Klemmung							
Metric · Metrisch							
Code	With / Without hole Mit / Ohne Loch	With / Without chipbreaker Mit / Ohne Spanbrecher	Section plane of Insert Plattenform	Code	With / Without hole Mit / Ohne Loch	With / Without chipbreaker Mit / Ohne Spanbrecher	Section plane of Insert Plattenform
B	✓	-	> 65°	N	-	-	
H	✓	Single-side Einseitig	> 65°	R	-	Single-side Einseitig	
C	✓	-	> 65°	F	-	Double-side Doppelseitig	
J	✓	Double-side Doppelseitig	> 65°	A	✓	-	
W	✓	-	≤ 65°	M	-	Single-side Einseitig	
T	✓	Single-side Einseitig	≤ 65°	G	✓	Double-side Doppelseitig	
Q	✓	-	≤ 65°	X	---	---	Special Spezial
U	✓	Double-side Doppelseitig	≤ 65°				

C

Indexable drills
WPS-Bohrer

Length of cutting edge Schneidenlänge		
Code	Length · Länge	
	W	S
03	3.8	
04	4.3	
05	5.4	
06	6.5	6.35
08	8.7	8.0
09		9.525
12		12.7

Insert thickness Dicke			
Thickness is defined as height from bottom of insert to the highest part of cutting edge Dicke ist definiert als Höhe von der Unterseite der WSP bis zur höchsten Stelle der Scheikante			
Code	Insert thickness WSP Dicke (mm)	Code	Insert thickness WSP Dicke (mm)
00	0.79	05	5.96
T0	0.99	T5	5.95
01	1.59	06	6.35
T1	1.98	T6	6.75
02	2.38	07	7.94
T2	2.58	09	9.52
03	3.18	T9	9.72
T3	3.97	11	11.11
04	4.76	12	12.70
T4	4.96		

08 04 12 R - PG

Nose radius Schneidenradius	
Code	Description Beschreibung
04	0.4mm
08	0.8mm
12	1.2mm

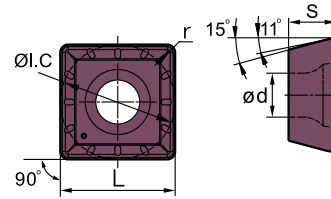
Cutting direction Vorschubrichtung	
Code	Description Beschreibung
R	Right hand / Rechts
L	Left hand / Links
N	Neutral

Chipbreaker code
Spanformstufe

Drilling - Bohren

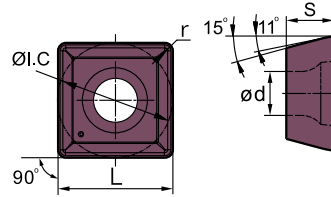
Indexable drill - Wendeschneidplattenbohrer

ZTD 02 / 03 / 04 / 05



Type Typ	Dimension Abmessung (mm)						Grade Sorte	
	L	ØI.C	s	ød	α	r	YBG205 outer insert Außenschnide	YBG212 inner insert Innenschnide
SPGT050204-PM	5	5	2.4	2.2	15°, 7°	0.4	•	•
SPGT060204-PM	6	6	2.4	2.6	15°, 11°	0.4	•	•
SPGT07T308-PM	7.94	7.94	4	2.8	15°, 11°	0.8	•	•
SPGT090408-PM	9.8	9.8	4.3	4.2	15°, 11°	0.8	•	•
SPGT110408-PM	11.5	11.5	4.8	4.4	15°, 11°	0.8	•	•
SPGT140512-PM	14.3	14.3	5.2	5.75	15°, 11°	1.2	•	•

• ex stock / ab Lager ○ on demand / auf Anfrage



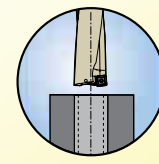
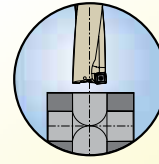
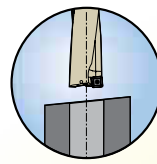
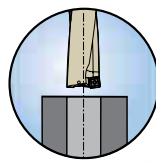
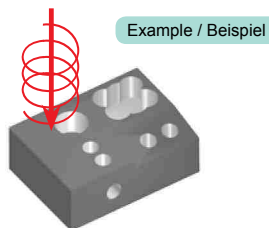
Type Typ	Dimension Abmessung (mm)						Grade Sorte	
	L	ØI.C	s	ød	r	YBG205 outer insert Außenschnide	YBG212 inner insert Innenschnide	
SPGT050204-EM	5	5	2.38	2.2	0.4	•	•	
SPGT060204-EM	6	6	2.38	2.6	0.4	•	•	
SPGT07T308-EM	7.94	7.94	3.97	2.8	0.8	•	•	
SPGT090408-EM	9.8	9.8	4.3	4.2	0.8	•	•	
SPGT110408-EM	11.5	11.5	4.76	4.4	0.8	•	•	
SPGT140512-EM	14.3	14.3	5.2	5.75	1.2	•	•	

• ex stock / ab Lager ○ on demand / auf Anfrage

Material Overview - Material Übersicht

✓ = Very suitable · Sehr empfohlen
 ✓ = Suitable · Empfohlen

Grade Sorte	Workpiece material - Werkstückstoff									
	Mild steel Baustahl HB≤180	Carbon steel Alloy Steel Kohlenstoff-, Legierter Stahl	Hardened steel · Gehärteter Stahl			Stainless steel Rostfreier Stahl	Cast iron Gusseisen	Nodular cast iron GGG Kugelgrah- itguss	Aluminum alloy Aluleg.	Copper alloy Kupferleg.
SPGT* - PM	✓	✓				✓	✓	✓		



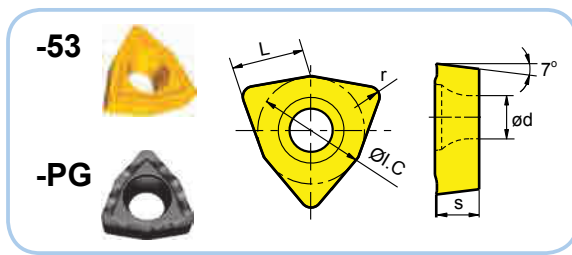
1 General boring
Allgemeine Bohrung

2 Inclined plane
Schiefe Ebene

3 Cross hole
Kreuzbohrung

4 expansion boring
Expansionsbohrung

Indexable inserts for drilling · WSP zum Bohren

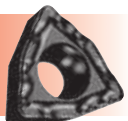


- Ideal Machining Condition
Gute Bearbeitungsbedingungen
- Normal Machining Condition
Normale Bearbeitungsbedingungen
- Unfavorable Machining Condition
Ungünstige Bearbeitungsbedingungen

Workpiece Material Werkstoffe	P	M	K	N	S
P Steel / Stahl	●	●	●	●	●
M Stainless Steel Rostfreier Stahl	●	●	●	●	●
K Cast Iron Gusseisen	●	●	●	●	●
N Non-ferrite material Ne Metalle					●
S Heat-resistant steel Warmfester Stahl	●				

Type Typ	Basic dimension(mm) · Basis Abmessungen					Grade · Sorte					
	L	I.C	s	d	r	YBG202	YBG205	YBG201	YBD252	YBG40	YD201
WCMX030208R-53	3.8	5.56	2.38	2.8	0.8	●		●	●	○	○
WCMX040208R-53	4.3	6.35	2.38	3.1	0.8	●		●	●	○	○
WCMX050308R-53	5.4	7.94	3.18	3.2	0.8	●		●	●	○	○
WCMX06T308R-53	6.5	9.525	3.97	3.7	0.8	●		●	●	○	○
WCMX080412R-53	8.7	12.7	4.76	4.3	1.2	●		●	●	○	○
WCMX030208-D	3.8	5.56	2.38	2.8	0.8				○	○	
WCMX040208-D	4.3	6.35	2.38	3.1	0.8				○	○	
WCMX050308-D	5.4	7.94	3.18	3.2	0.8				○	○	
WCMX06T308-D	6.5	9.525	3.97	3.7	0.8				○	○	
WCMX080412-D	8.7	12.7	4.76	4.3	1.2				○	○	
WCMX030208R-PG	3.8	5.56	2.38	2.8	0.8	●			○		
WCMX040208R-PG	4.3	6.35	2.38	3.1	0.8	●			○		
WCMX050308R-PG	5.4	7.94	3.18	3.2	0.8	●	○		○		
WCMX06T308R-PG	6.5	9.525	3.97	3.7	0.8	●			○		
WCMX080412R-PG	8.7	12.7	4.76	4.3	1.2	●			○		

-PG chipbreaker -PG Spanbrecher



Unique design of waveform edge ensure high edge strength and good chip breaking performance for machining carbon steel and alloy steel.

Wellenförmige Schneide mit hoher Stabilität und Spankontrolle zur Bearbeitung von Kohlenstoffstahl, legiertem Stahl und Guss

-53 chipbreaker -53 Spanbrecher



Sharp cutting edge benefits to achieve low roughness surface, mainly applicable for low load cutting of aluminum alloy, mild steel, stainless steel and cast iron.

Scharfe Schneidkante zur Erzielung exklusiver Oberflächen. Zur Bearbeitung von Alulegierungen, Baustahl, rostfreiem Stahl und Grauguss.

-D chipbreaker -D Spanbrecher



Inserts for outer positioning with optimized chipbreaker geometry. And good chip breaking performance for machining, steel, stainless steel, cast iron for common cutting speed .

Optimierte Geometrie als Außenschneide einsetzbar. Gute Spankontrolle bei Stahl, rostfreiem Stahl, Grauguss bei mittleren Schnittgeschwindigkeiten.

Drilling - Bohren

General technical information · Allgemeine Technische Information

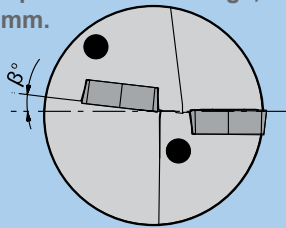
Comparison table for drilling Insert - Grades
Bohrwendepplatten Übersichtstabelle - Sorten

Workpiece material Werkstück Material	ISO	Coating · Beschichtung		Cermet Cermet	uncoated carbide unb. Hartmetall	PCBN & PCD PCBN & PKD
		CVD	PVD			
P Steel · Stahl	P01					
	P10		YBG202 YBG205 YBG212			
	P20	YBD252				
	P30					
	P40					
M Stainless Steel Rostfreier Stahl	M01					
	M10		YBG202 YBG205 YBG212			
	M20					
	M30					
	M40					
K Cast iron · Grauguss	K01					
	K10	YBD252		YBG202 YBG205 YBG212		
	K20					
	K30					
	K40					
N Non-ferrous materials Ne - Metalle	N01					
	N10					
	N20				YD201	
	N30					
S Heat-resistant steel Warmfester Stahl	S01					
	S10		YBG202 YBG205			
	S20					
	S30					
H Hardened material Gehärtete Werkstoffe	H01					
	H10					
	H20					
	H30					



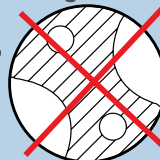
Features of drill · Merkmale der WSP-Bohrer

- ❑ Perfect insert assembling angle makes balanced cutting force, low vibration in machining process, thus achieve excellent surface quality.
- ❑ Advanced flute design possesses large chip pocket for chip removal.
- ❑ Complete diameter range, from 16 mm to 58 mm.
- ❑ Perfekte WSP Positionierung für ausgewogene Schnittkraftverteilung. Zur Erzielung guter Oberflächen.
- ❑ Fortschrittlicher großer Spanraum für eine gute Spanabfuhr.
- ❑ kompletter Durchmesserbereich von 16 mm-58mm



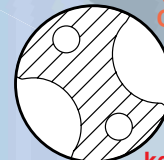
Small chip pocket
Easy to generate chips
jamming

kleiner Spanraum,
Spanstau.



Competitor
Wettbewerber

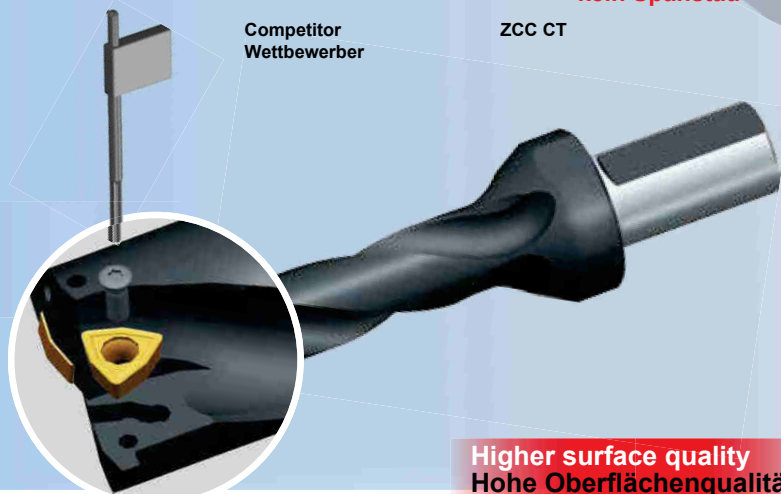
Large chip pocket
Chip jamming
free



Großer
Spanraum
kein Spanstau

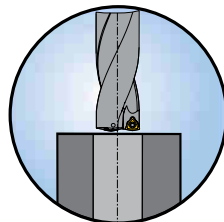
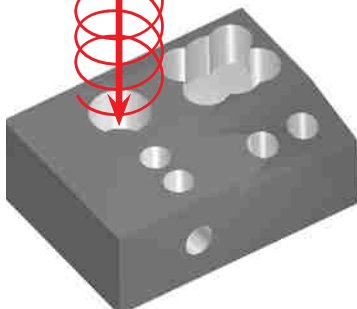
ZCC CT

Insert assembling WSP Wechsel

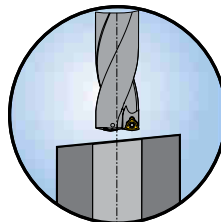


Higher surface quality
Hohe Oberflächenqualität

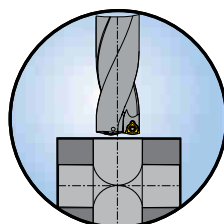
Applications Anwendung



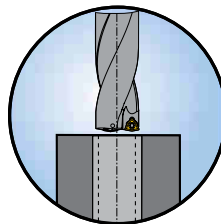
1. Common drilling
Normalbohren



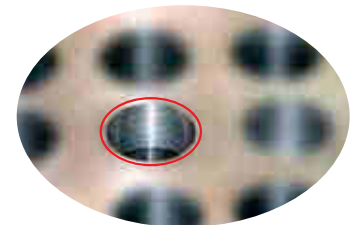
2. Slant face drilling
Schrägbohren



3. Cross-hole drilling
Bohren bei
Querbohrungen



4. Counterboring
Aufbohren



Better chip breaking performance
Gute Spankontrolle

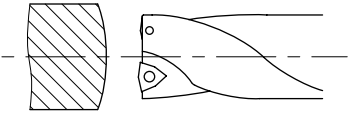
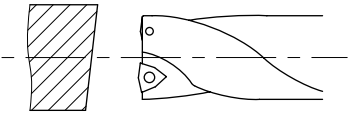
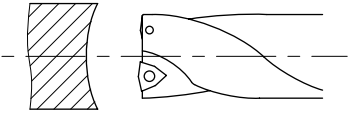
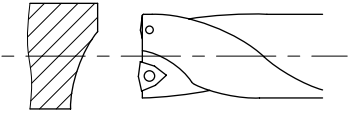
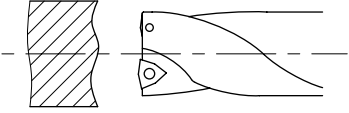


Technical information for shallo drills · Technische Informationen über WSP-Bohrer

■ initial drill penetration · Das Anbohren

Initial drill penetration is an important factor for successful drilling. One way of ensuring good hole quality is to make sure the penetration surface of the workpiece is vertical to the drill centre axis. In addition, an indexable drill can carry out initial penetration of convex, concave, inclined and irregular surfaces when accompanied with an adjustment of feed rates.

Das Anbohren ist ein wichtiger bzw. entscheidender Faktor für das erfolgreiche Bohren. Eine gute Bohrungsqualität und Standzeit erzielt man bei einer ebenen Anbohrfläche vertikal zur Bohrerachse. Beim Anbohren in konkaven, konvexen und unebenen Flächen soll der Vorschub entsprechend reduziert werden.

Workpiece surface Werkstück Oberflächen	Countermeasures Maßnahmen
	<p>For a convex surface, the conditions are relatively good and the centre of the drill ideally makes contact with the workpiece first, thus can adopt normal feed.</p> <p>Bei konvexen Anbohrflächen ist die Bearbeitungssituation relativ gut. Der erste Kontakt des Bohrers geschieht über die Zentrumschneide, so daß normale Vorschübe gewählt werden können.</p>
	<p>When penetrating an inclined surface, the cutting edges will be unevenly loaded which may result in the premature drill wear. If the angle of the inclined surface is larger than two degrees, the feed should be reduced to 1/3 of that recommended for the drill.</p> <p>Bei Schrägflächen wird der Bohrer aus dem Zentrum gedrückt. Dadurch wird der Bohrerverschleiß erhöht. Bei einem Winkel von über 2° sollte der Vorschub auf 1/3 der empfohlenen Werte reduziert werden.</p>
	<p>When drilling into concave surface, drill center axis normally tends to off-center, the feed should be reduced to 1/3 of that recommended for the drill.</p> <p>Beim Anbohren in konkaven Flächen kann der Bohrer aus dem Zentrum gedrückt werden. Vorschub auf 1/3 reduzieren.</p>
	<p>When drilling into non-symmetric curved surfaces, the drill tends to deviate from the centre because of penetrating against an inclined surface. The feed should be reduced to lower than that recommended for the initial penetration of concave surfaces.</p> <p>Beim Bohren in asymmetrischen Flächen sollte der Vorschub entsprechend reduziert werden, eventuell auf unter die Werte, die für das erste Eindringen in konkave Flächen empfohlen werden.</p>
	<p>When drilling into irregular surface, there is a risk of the inserts chipping and this may also occur when drilling through the workpiece. Therefore the feed rate should be reduced.</p> <p>Beim Bohren in stark asymmetrische Flächen können beim Anbohren und beim Austritt des Bohres aus dem Werkstück Ausbrüche an der Wendeschneidplatte entstehen. Auch hier den Vorschub entsprechend reduzieren.</p>

Calculations for shallow drilling · Berechnungsbeispiele für WSP-Bohrer

• Cutting speed · Schnittgeschwindigkeit (V_c)

$$V_c = \frac{D_c \times \pi \times n}{1000}$$

V_c (m/min): cutting speed
Schnittgeschwindigkeit
 n (rev/min): rotating speed · Umdrehungen

D_c (mm): drill diameter
Bohrerdurchm. \varnothing
 $\pi \sim 3,14$

- Example Spindle speed is 1600 rev/min, drill diameter is 20mm, thus cutting speed is:
Beispiel Spindelumdrehung beträgt 1600 u/min, Bohrerdurchmesser ist 20mm, dadurch ist die Schnittgeschw.:

$$V_c = \frac{D_c \times \pi \times n}{1000} = \frac{20 \times 3.14 \times 1600}{1000} = 100 \text{ (m/min)}$$

• Feed speed · Vorschub

$$V_f = fr \times n \text{ (mm/min)}$$

V_f (mm/min): feed speed
Schnittgeschwindigkeit
 n (rev/min): spindle speed · Umdrehungen

fr (mm/rev): feed rate per revolution
Vorschub pro Umdrehung

- Example Spindle speed is 1500 rev/min, feed rate per revolution is 0.1mm/rev, thus feed speed is:
Beispiel Spindelumdrehung beträgt 1500 u / min, Vorschub pro Umdrehung = 0,1 mm / rev:

$$V_f = fr \times n = 0.1 \times 1500 = 150 \text{ (mm/min)}$$

• Machining time · Bearbeitungszeit

$$T_c = \frac{I_d \times i}{n \times f}$$

T_c (min): machining time
Bearbeitungszeit
 i : number of holes
 i : Anzahl der Bohrung.

I_d (mm): drilling depth
Bohrtiefe

fr (mm/rev): feed rate per revolution
Vorschub pro Umdrehung
 n (rev/min): spindle speed
Drehzahl

- Example Calculate the drilling time, with following formular:
Beispiel

drill diameter 20mm, depth 40mm
cutting speed 100m/min
feed rate 0,1/rev

$$n = \frac{V_c \times 1000}{D_c \times \pi} = \frac{100 \times 1000}{20 \times 3.14} = 1600 \text{ (rev/min)}$$

Berechnen Sie die Bohrzeit, mit folgender Formel:

Bohrerdurchm. 20mm, Bohrtiefe 40mm
Schnittgeschwindigk. 100m/min
Vorschub pro Umdrehung 0,1/re

$$T_c = \frac{I_d \times i}{n \times fr} = \frac{40 \times 1}{1600 \times 0.1} = 0.25 \text{ (min)}$$

• Metal removal rate · Zerspanungsvolumen

$$Q = \frac{V_f \times \pi \times D_c^2}{4 \times 1000}$$

Q (cm³/min): metal removal rate
 Q (cm³/min): Zerspanungsvolumen
 V_f (mm/min): feed speed · Vorschub
 $\pi \sim 3,14$

D_c (mm): drill diameter
 D_c (mm): Bohrerdurchmesser

- Example Drill diameter is 20mm, feed speed is 160mm/min, thus metal removal rate is:
Beispiel Bohrdurchmesser 20mm, Vorschub ist 160mm/min, dadurch liegt das Zerspanungsvolumen bei:

$$Q = \frac{V_f \times \pi \times D_c^2}{4 \times 1000} = \frac{160 \times 3.14 \times 20^2}{4 \times 1000} = 50.24 \text{ (cm}^3\text{/min)}$$

Drilling · Bohren

Indexable drill · Wendeschneidplattenbohrer

Recommended cutting data for shallow drills · Empfohlene Schnittdaten für WSP-Bohrer

ISO	Material	Hardness HB Härte HB	Diameter Ø Durchmesser [mm]	Feed rate Vorschub fn [mm/r]	Cutting speed Schnittgeschwindigkeit Vc [m/min]
P	Carbon steel Kohlenstoff- stahl	80-200	16.0-23.0 24.0-30.0 31.0-38.0 39.0-46.0 47.0-58.0	0.05-0.09 0.05-0.09 0.06-0.10 0.07-0.11 0.08-0.12	200(170-240)
	Low alloy steel Niedrigleg. Stahl	150-260	16.0-23.0 24.0-30.0 31.0-38.0 39.0-46.0 47.0-58.0	0.05-0.09 0.05-0.12 0.06-0.14 0.08-0.16 0.10-0.20	170(140-220)
	High alloy steel Hochleg. Stahl	150-320	16.0-23.0 24.0-30.0 31.0-38.0 39.0-46.0 47.0-58.0	0.05-0.09 0.05-0.12 0.06-0.16 0.08-0.18 0.10-0.22	150(120-180)
	Cast steel Gussstahl	180-250	16.0-23.0 24.0-30.0 31.0-38.0 39.0-46.0 47.0-58.0	0.05-0.08 0.05-0.08 0.06-0.10 0.07-0.11 0.07-0.12	140(120-170)
M	Stainless steel Ferrite Martensite Rostfreier Stahl	150-270	16.0-23.0 24.0-30.0 31.0-38.0 39.0-46.0 47.0-58.0	0.05-0.09 0.05-0.12 0.06-0.16 0.08-0.18 0.10-0.22	160(110-230)
	Austenite Austenit	150-275	16.0-23.0 24.0-30.0 31.0-38.0 39.0-46.0 47.0-58.0	0.05-0.09 0.05-0.11 0.06-0.13 0.08-0.14 0.10-0.16	140(110-220)
K	Malleable cast iron Temperguss	150-230	16.0-23.0 24.0-30.0 31.0-38.0 39.0-46.0 47.0-58.0	0.05-0.10 0.05-0.14 0.08-0.16 0.10-0.20 0.12-0.24	160(120-220)
	Gray cast iron Grauguss	150-220	16.0-23.0 24.0-30.0 31.0-38.0 39.0-46.0 47.0-58.0	0.05-0.10 0.05-0.14 0.08-0.16 0.10-0.20 0.12-0.24	200(170-240)
	Nodular cast iron GGG Kugelgra- phitguss	160-250	16.0-23.0 24.0-30.0 31.0-38.0 39.0-46.0 47.0-58.0	0.05-0.09 0.05-0.12 0.06-0.14 0.08-0.16 0.10-0.20	160(130-200)
N	Al alloy Alulegierung	60-110	16.0-23.0 24.0-30.0 31.0-38.0 39.0-46.0 47.0-58.0	0.05-0.10 0.05-0.14 0.08-0.16 0.10-0.20 0.12-0.24	300(250-350)

C

Indexable drills
WSP-Bohrer