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**New**

NEW INDEXABLE DRILL FOR HOLE MAKING

# SPD & NPD



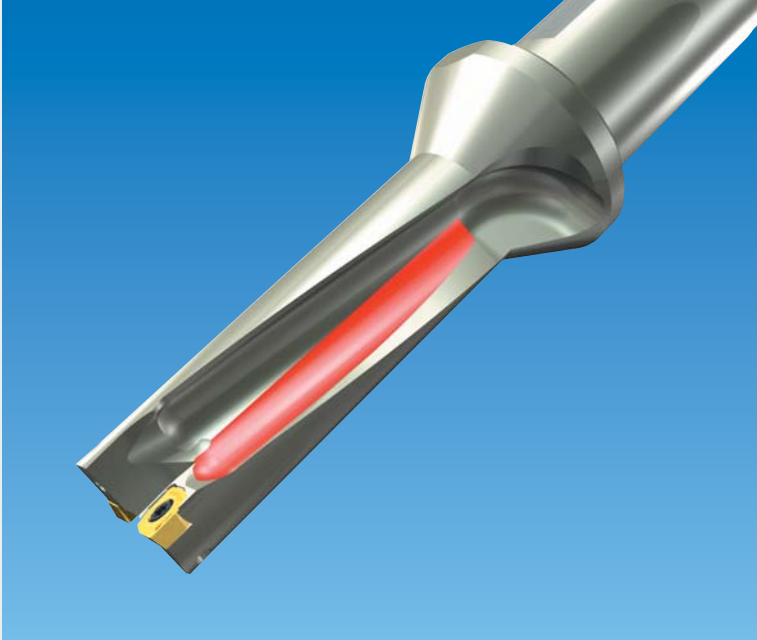
## Features

- Excellent chip evacuation due to the specially designed flute
- Special surface treatment of shank provides long durability
- 4 cutting-edge using economical geometry of insert
- Various chip breakers & grades are available for variety of application
- SPD  $\varnothing$ 13mm ~  $\varnothing$ 22mm, NPD  $\varnothing$ 23mm ~  $\varnothing$ 60mm

# Characteristics of SPD & NPD



## Excellent chip evacuation due to the specially designed flute



- **Chip evacuation property has been improved due to the wider flute area of actual cutting part**
- Due to the 20% wider flute area of drill head part, chip evacuation property has been improved
- Good chip evacuation at high feed application
- Despite of wider flute design, rigidity of shank has been maintained as strong enough

## Special surface treatment of drill

### ● SPD (Superior Piercing Drill)



Available diameter :  $\varnothing 13 \sim \varnothing 22$ (mm)

### ● NPD (New Piercing Drill)



Available diameter :  $\varnothing 23 \sim \varnothing 60$ (mm)

- Abrasive wear resistance of holder with machined chip has been improved due to the special surface treatment
- Durability of drill has been prolonged
- Strong and luxury image of metallic color

# Characteristics of SPD & NPD



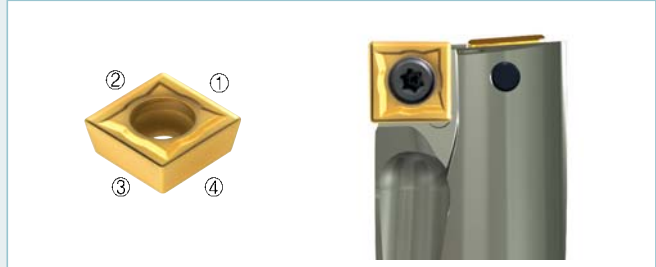
## Insert for SPD

### 4 cutting-edge using insert



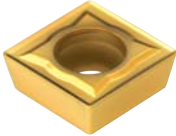
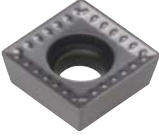
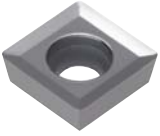
- Chip breaker of SPD insert provides excellent chip control property due to its engineered design
- Easy & simple change of cutting edge

### Same insert is available for both position of insert pocket of drill



- Economical by using same insert at both position of insert pocket of drill
- Available SPD size :  $\varnothing 13\text{mm} \sim \varnothing 22\text{mm}$
- Since SPD makes small-sized chip, it is effective for small size hole drilling

### Recommendation of chip breaker & grade as per workpiece

DM		DS	DA
			
PC3535	PC6510	PC9530	H01
Steel	Cast iron	Stainless	Aluminum

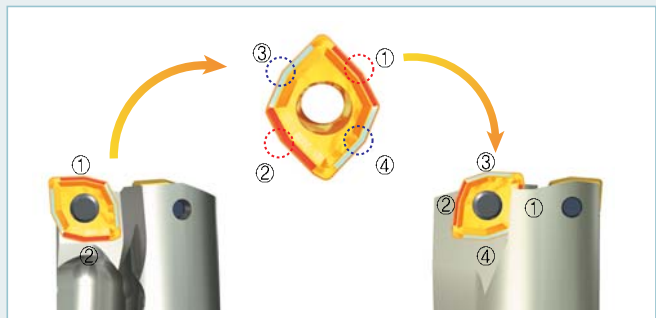
## Insert for NPD

### 4 cutting-edge using insert




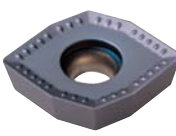


- Since NPD has strong cutting edge, it is suitable for big size hole drilling
- Available NPD size :  $\varnothing 23\text{mm} \sim \varnothing 60\text{mm}$

### How to use 4 cutting edge of NPD insert



- At first, use No ①, ② edges at the outer position of insert pocket and then take the insert to the inner position of insert pocket of drill to use ③, ④

### Recommendation of chip breaker & grade as per workpiece

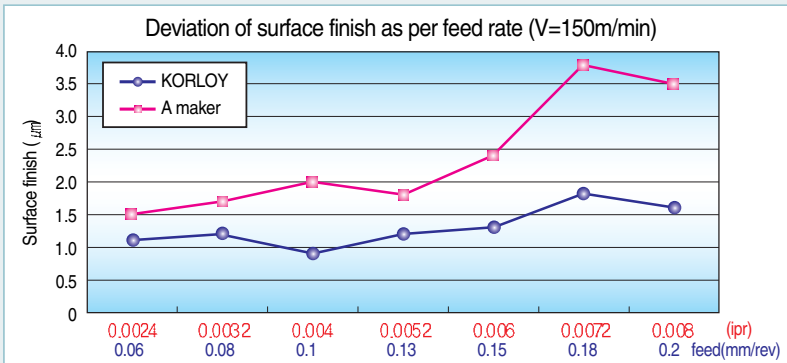
DM		DS	DR	DA
				
PC3535	PC6510	PC9530	PC3535	H01
Steel	Cast iron	Stainless	Soft steel	Aluminum

# Characteristics of SPD & NPD



## Excellent surface finish

### Deviation of surface finish



KORLOY's NPD & SPD show excellent surface finish even in high feed operation

#### Cutting condition

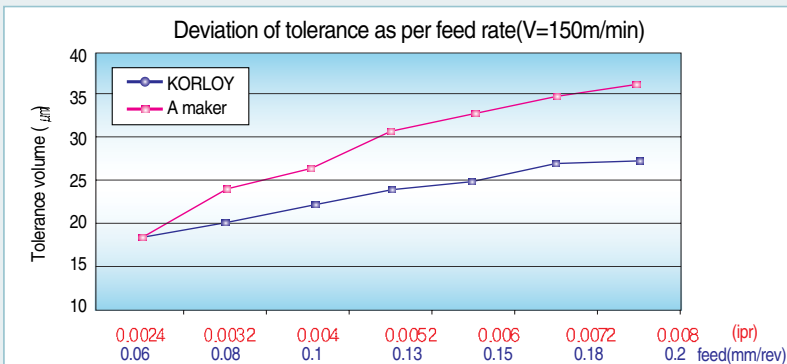
- KORLOY Drill : SPD190-25-3
- Insert : SPMT060204-DM(PC9530)
- V=150m/min, d=25mm, wet
- V=500sfm, d=1inch, wet
- Workpiece : SCM440 (AISI4140, 42CrMo4)

#### Test result

- SPD has got surface finish Ra under 2.0 µm which is much better than competitor's

## Precise hole diameter

### Tolerance of machined hole



#### Cutting condition

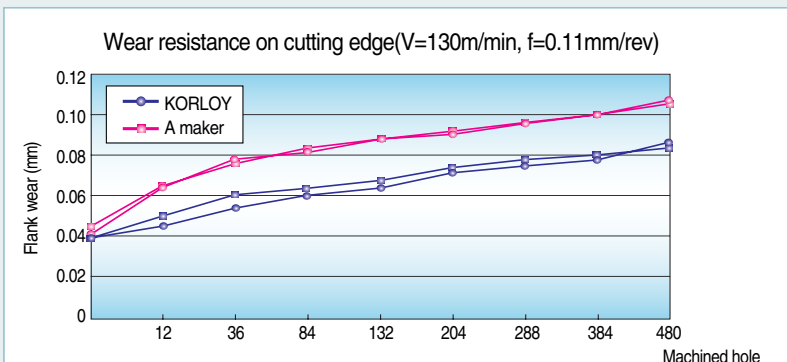
- KORLOY Drill : NPD260-32-3
- Insert : NPMT252808-DM(PC3535)
- V=150m/min, d=25mm, wet
- V=500sfm, d=1inch, wet
- Workpiece : SCM440 (AISI4140, 42CrMo4)

#### Test result

- NPD has got better tolerance than competitor's as per feed rate variation

## Long tool life

### Wear on cutting edge as per machined hole

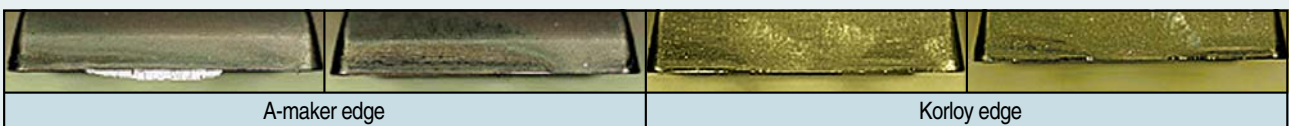


#### Cutting condition

- KORLOY Drill : SPD190-25-3
- Insert : SPMT060204-DM(PC9530)
- V=110m/min, f=0.11mm/rev, d=25mm, wet
- V=363sfm, f=0.004ipr, d=1inch, wet
- Workpiece : SCM440 (AISI4140, 42CrMo4) 480holes

#### Test result

- Longer tool life and better wear resistance than A-maker

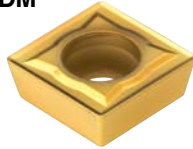


# SPD & NPD Insert

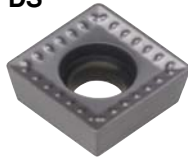


## SPD - SPMT

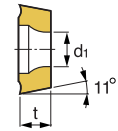
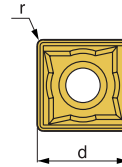
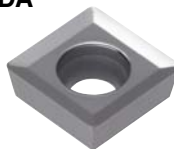
DM



DS



DA



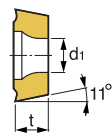
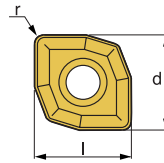
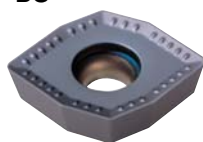
Designation	Diameter(mm)	d	t	r	d <sub>1</sub>	Grade
SPMT050203-DM	Ø13~ Ø15	5.3	2.4	0.3	2.3	PC3535 PC6510
SPMT060204-DM	Ø16~ Ø19	6.2	2.5	0.4	2.5	
SPMT070204-DM	Ø20~ Ø22	7.2	2.5	0.4	2.8	
SPMT050203-DS	Ø13~ Ø15	5.3	2.4	0.3	2.3	PC9530
SPMT060204-DS	Ø16~ Ø19	6.2	2.5	0.4	2.5	
SPMT070204-DS	Ø20~ Ø22	7.2	2.5	0.4	2.8	
SPET050203-DA	Ø13~ Ø15	5.3	2.4	0.3	2.3	H01
SPET060204-DA	Ø16~ Ø19	6.2	2.5	0.4	2.5	
SPET070204-DA	Ø20~ Ø22	7.2	2.5	0.4	2.8	

## NPD - NPMT

DM



DS



Designation	Diameter(mm)	l	d	t	r	d <sub>1</sub>	Grade
NPMT222408-DM	Ø23~ Ø24	8.3	8.2	2.5	0.8	2.8	PC3535 PC6510
NPMT252808-DM	Ø25~ Ø28	9.3	9.2	3.3	0.8	3.4	
NPMT293208-DM	Ø29~ Ø32	10.3	10.2	3.3	0.8	3.4	
NPMT334008-DM	Ø33~ Ø40	13	12.9	3.97	0.8	4	
NPMT415008-DM	Ø41~ Ø50	15.3	15.2	4.76	0.8	4.5	
NPMT516012-DM	Ø51~ Ø60	18.3	18.2	5	1.2	5.5	PC9530
NPMT222408-DS	Ø23~ Ø24	8.3	8.2	2.5	0.8	2.8	
NPMT252808-DS	Ø25~ Ø28	9.3	9.2	3.3	0.8	3.4	
NPMT293208-DS	Ø29~ Ø32	10.3	10.2	3.3	0.8	3.4	
NPMT334008-DS	Ø33~ Ø40	13	12.9	3.97	0.8	4	
NPMT415008-DS	Ø41~ Ø50	15.3	15.2	4.76	0.8	4.5	H01
NPMT516012-DS	Ø51~ Ø60	18.3	18.2	5	1.2	5.5	

# SPD & NPD Insert

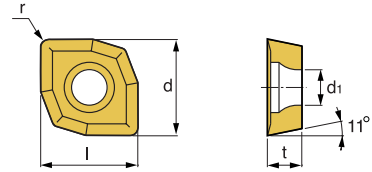


## NPD - NPMT

DR



DA



Designation	Diameter(mm)	l	d	t	r	d <sub>1</sub>	Grade
NPET222408-DR	Ø23~Ø24	8.3	8.2	2.5	0.8	2.8	PC3535
NPET252808-DR	Ø25~Ø28	9.3	9.2	3.3	0.8	3.4	
NPET293208-DR	Ø29~Ø32	10.3	10.2	3.3	0.8	3.4	
NPET334008-DR	Ø33~Ø40	13	12.9	3.97	0.8	4	
NPET415008-DR	Ø41~Ø50	15.3	15.2	4.76	0.8	4.5	
NPET516012-DR	Ø51~Ø60	18.3	18.2	5	1.2	5.5	
NPET222408-DA	Ø23~Ø24	8.3	8.2	2.5	0.8	2.8	H01
NPET252808-DA	Ø25~Ø28	9.3	9.2	3.3	0.8	3.4	
NPET293208-DA	Ø29~Ø32	10.3	10.2	3.3	0.8	3.4	
NPET334008-DA	Ø33~Ø40	13	12.9	3.97	0.8	4	
NPET415008-DA	Ø41~Ø50	15.3	15.2	4.76	0.8	4.5	
NPET516012-DA	Ø51~Ø60	18.3	18.2	5	1.2	5.5	

## Examples of choosing proper tool

- **Workpiece : SCM440, Hole size : Ø17mm, Depth : 40mm**

Insert : SPMT060204-DM PC3535

Drill : SPD170-25-3

- **Workpiece : Stainless steel, Hole size : Ø27mm, Depth : 45mm**

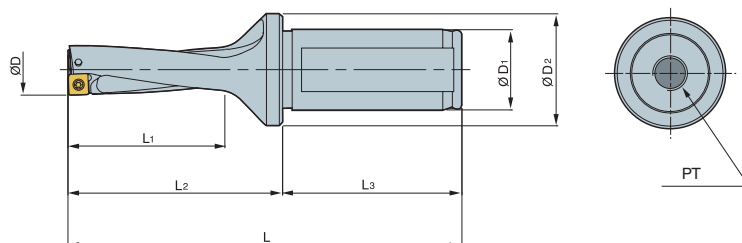
Insert : NPMT252808-DS PC9530

Drill : NPD270-32-2

# SPD & NPD



SPD



(mm)

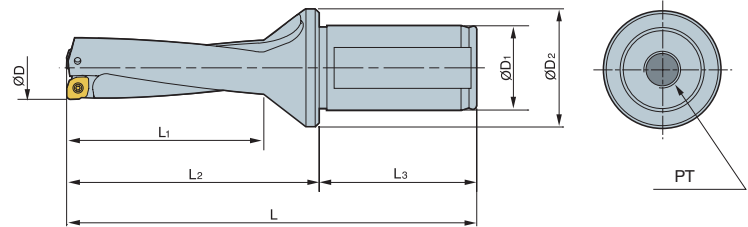
Holder	Stock	Insert	øD	øD1	øD2	L1	L2	L3	L	PT	Parts	
											Screw	Wrench
SPD130-20-2	●	SPM(E)T050203-□□	13	20	24	26	43	50	93	PT1/8	FTNA0204	TW06P
SPD140-20-2	●	SPM(E)T050203-□□	14	20	24	28	46	50	96	PT1/8	FTNA0204	TW06P
SPD150-20-2	●	SPM(E)T050203-□□	15	20	24	30	49	50	99	PT1/8	FTNA0204	TW06P
SPD160-25-2	●	SPM(E)T060204-□□	16	25	34	32	51	56	107	PT1/8	FTKA02206S	TW07S
SPD170-25-2	●	SPM(E)T060204-□□	17	25	34	34	53	56	109	PT1/8	FTKA02206S	TW07S
SPD180-25-2	●	SPM(E)T060204-□□	18	25	34	36	56	56	112	PT1/8	FTKA02206S	TW07S
SPD190-25-2	●	SPM(E)T060204-□□	19	25	34	38	58	56	114	PT1/8	FTKA02206S	TW07S
SPD200-25-2	●	SPM(E)T070204-□□	20	25	34	40	62	56	118	PT1/8	FTKA02565	TW07S
SPD210-25-2	●	SPM(E)T070204-□□	21	25	34	42	64	56	120	PT1/8	FTKA02565	TW07S
SPD220-25-2	●	SPM(E)T070204-□□	22	25	34	44	66	56	122	PT1/8	FTKA02565	TW07S
SPD130-20-3	●	SPM(E)T050203-□□	13	20	24	39	56	50	106	PT1/8	FTNA0204	TW06P
SPD140-20-3	●	SPM(E)T050203-□□	14	20	24	42	60	50	110	PT1/8	FTNA0204	TW06P
SPD150-20-3	●	SPM(E)T050203-□□	15	20	24	45	64	50	114	PT1/8	FTNA0204	TW06P
SPD160-25-3	●	SPM(E)T060204-□□	16	25	34	48	67	56	123	PT1/8	FTKA02206S	TW07S
SPD170-25-3	●	SPM(E)T060204-□□	17	25	34	51	70	56	126	PT1/8	FTKA02206S	TW07S
SPD180-25-3	●	SPM(E)T060204-□□	18	25	34	54	74	56	130	PT1/8	FTKA02206S	TW07S
SPD190-25-3	●	SPM(E)T060204-□□	19	25	34	57	77	56	133	PT1/8	FTKA02206S	TW07S
SPD200-25-3	●	SPM(E)T070204-□□	20	25	34	60	82	56	138	PT1/8	FTKA02565	TW07S
SPD210-25-3	●	SPM(E)T070204-□□	21	25	34	63	85	56	141	PT1/8	FTKA02565	TW07S
SPD220-25-3	●	SPM(E)T070204-□□	22	25	34	66	88	56	144	PT1/8	FTKA02565	TW07S
SPD130-20-4	●	SPM(E)T050203-□□	13	20	24	52	69	50	119	PT1/8	FTNA0204	TW06P
SPD140-20-4	●	SPM(E)T050203-□□	14	20	24	56	74	50	124	PT1/8	FTNA0204	TW06P
SPD150-20-4	●	SPM(E)T050203-□□	15	20	24	60	79	50	129	PT1/8	FTNA0204	TW06P
SPD160-25-4	●	SPM(E)T060204-□□	16	25	34	64	83	56	139	PT1/8	FTKA02206S	TW07S
SPD170-25-4	●	SPM(E)T060204-□□	17	25	34	68	87	56	143	PT1/8	FTKA02206S	TW07S
SPD180-25-4	●	SPM(E)T060204-□□	18	25	34	72	92	56	148	PT1/8	FTKA02206S	TW07S
SPD190-25-4	●	SPM(E)T060204-□□	19	25	34	76	96	56	152	PT1/8	FTKA02206S	TW07S
SPD200-25-4	●	SPM(E)T070204-□□	20	25	34	80	102	56	158	PT1/8	FTKA02565	TW07S
SPD210-25-4	●	SPM(E)T070204-□□	21	25	34	84	106	56	162	PT1/8	FTKA02565	TW07S
SPD220-25-4	●	SPM(E)T070204-□□	22	25	34	88	110	56	166	PT1/8	FTKA02565	TW07S

●: Stock item, ○: Under preparing for stock

# SPD & NPD



## NPD



(mm)

Holder	Stock	Insert	$\varnothing D$	$\varnothing D_1$	$\varnothing D_2$	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L	PT	Parts	
											Screw	Wrench
NPD230-32-2	○	NPM(E)T222408-□□	23	32	44	46	70	60	130	PT1/4	FTKA02565	TW07S
NPD240-32-2	●	NPM(E)T222408-□□	24	32	44	48	72	60	132	PT1/4	FTKA02565	TW07S
NPD250-32-2	●	NPM(E)T252808-□□	25	32	44	50	75	60	135	PT1/4	FTKA0307	TW09S
NPD260-32-2	○	NPM(E)T252808-□□	26	32	44	52	77	60	137	PT1/4	FTKA0307	TW09S
NPD270-32-2	○	NPM(E)T252808-□□	27	32	44	54	80	60	140	PT1/4	FTKA0307	TW09S
NPD280-32-2	●	NPM(E)T252808-□□	28	32	44	56	83	60	143	PT1/4	FTKA0307	TW09S
NPD290-32-2	●	NPM(E)T293208-□□	29	32	44	58	85	60	145	PT1/4	FTKA0307	TW09S
NPD300-32-2	●	NPM(E)T293208-□□	30	32	44	60	89	60	149	PT1/4	FTKA0307	TW09S
NPD310-32-2	○	NPM(E)T293208-□□	31	32	44	62	91	60	151	PT1/4	FTKA0307	TW09S
NPD320-32-2	○	NPM(E)T293208-□□	32	32	44	64	93	60	153	PT1/4	FTKA0307	TW09S
NPD330-40-2	○	NPM(E)T334008-□□	33	40	48	66	98	70	168	PT3/8	FTKA03508	TW15S
NPD340-40-2	○	NPM(E)T334008-□□	34	40	48	68	100	70	170	PT3/8	FTKA03508	TW15S
NPD350-40-2	○	NPM(E)T334008-□□	35	40	48	70	102	70	172	PT3/8	FTKA03508	TW15S
NPD360-40-2	○	NPM(E)T334008-□□	36	40	48	72	105	70	175	PT3/8	FTKA03508	TW15S
NPD400-40-2	○	NPM(E)T334008-□□	40	40	48	80	115	70	185	PT3/8	FTKA03508	TW15S
NPD450-40-2	○	NPM(E)T415008-□□	45	40	58	90	129	70	199	PT3/8	FTKA0410	TW15S
NPD500-40-2	○	NPM(E)T415008-□□	50	40	58	100	142	70	212	PT3/8	FTKA0410	TW15S
NPD550-40-2	○	NPM(E)T516012-□□	55	40	68	110	156	70	226	PT3/8	FTNC04511	TW20S
NPD600-40-2	○	NPM(E)T516012-□□	60	40	68	120	172	70	242	PT3/8	FTNC04511	TW20S
NPD230-32-3	●	NPM(E)T222408-□□	23	32	44	69	93	60	153	PT1/4	FTKA02565	TW07S
NPD240-32-3	●	NPM(E)T222408-□□	24	32	44	72	96	60	156	PT1/4	FTKA02565	TW07S
NPD250-32-3	●	NPM(E)T252808-□□	25	32	44	75	100	60	160	PT1/4	FTKA0307	TW09S
NPD260-32-3	●	NPM(E)T252808-□□	26	32	44	78	103	60	163	PT1/4	FTKA0307	TW09S
NPD270-32-3	●	NPM(E)T252808-□□	27	32	44	81	107	60	167	PT1/4	FTKA0307	TW09S
NPD280-32-3	●	NPM(E)T252808-□□	28	32	44	84	111	60	171	PT1/4	FTKA0307	TW09S
NPD290-32-3	●	NPM(E)T293208-□□	29	32	44	87	114	60	174	PT1/4	FTKA0307	TW09S
NPD300-32-3	●	NPM(E)T293208-□□	30	32	44	90	119	60	179	PT1/4	FTKA0307	TW09S
NPD310-32-3	●	NPM(E)T293208-□□	31	32	44	93	122	60	182	PT1/4	FTKA0307	TW09S
NPD320-32-3	●	NPM(E)T293208-□□	32	32	44	96	125	60	185	PT1/4	FTKA0307	TW09S
NPD330-32-3	●	NPM(E)T334008-□□	33	32	48	99	131	60	201	PT1/4	FTKA03508	TW15S
NPD340-32-3	●	NPM(E)T334008-□□	34	32	48	102	134	60	204	PT1/4	FTKA03508	TW15S
NPD350-32-3	●	NPM(E)T334008-□□	35	32	48	105	137	60	207	PT1/4	FTKA03508	TW15S
NPD360-32-3	●	NPM(E)T334008-□□	36	32	48	108	141	60	211	PT1/4	FTKA03508	TW15S
NPD370-32-3	●	NPM(E)T334008-□□	37	32	48	111	144	60	214	PT1/4	FTKA03508	TW15S
NPD380-32-3	●	NPM(E)T334008-□□	38	32	48	114	148	60	218	PT1/4	FTKA03508	TW15S
NPD390-32-3	●	NPM(E)T334008-□□	39	32	48	117	151	60	221	PT1/4	FTKA03508	TW15S
NPD400-32-3	●	NPM(E)T334008-□□	40	32	48	120	155	60	225	PT1/4	FTKA03508	TW15S
NPD330-40-3	●	NPM(E)T334008-□□	33	40	48	99	131	70	201	PT3/8	FTKA03508	TW15S
NPD340-40-3	●	NPM(E)T334008-□□	34	40	48	102	134	70	204	PT3/8	FTKA03508	TW15S
NPD350-40-3	●	NPM(E)T334008-□□	35	40	48	105	137	70	207	PT3/8	FTKA03508	TW15S
NPD360-40-3	●	NPM(E)T334008-□□	36	40	48	108	141	70	211	PT3/8	FTKA03508	TW15S
NPD400-40-3	●	NPM(E)T334008-□□	40	40	48	120	155	70	225	PT3/8	FTKA03508	TW15S
NPD450-40-3	●	NPM(E)T415008-□□	45	40	58	135	174	70	244	PT3/8	FTKA0410	TW15S
NPD500-40-3	●	NPM(E)T415008-□□	50	40	58	150	192	70	262	PT3/8	FTKA0410	TW15S

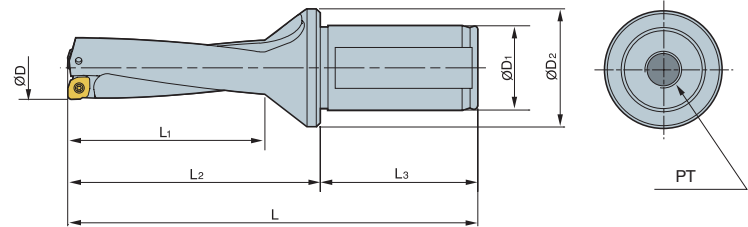
● : Stock item, ○ : Under preparing for stock



# SPD & NPD



## NPD

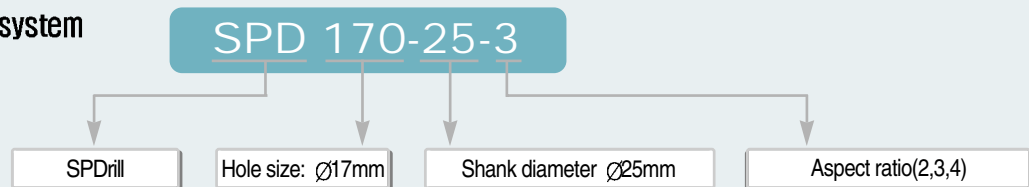


(mm)

Holder	Stock	Insert	ØD	ØD1	ØD2	L1	L2	L3	L	PT	Parts	
											Screw	Wrench
NPD550-40-3	○	NPM(E)T516012-□□	55	40	68	165	211	70	281	PT3/8	FTNC04511	TW20S
NPD600-40-3	○	NPM(E)T516012-□□	60	40	68	180	232	70	302	PT3/8	FTNC04511	TW20S
NPD450-42-3	●	NPM(E)T415008-□□	45	42	58	135	174	70	244	PT3/8	FTKA0410	TW15S
NPD500-42-3	●	NPM(E)T415008-□□	50	42	58	150	192	70	262	PT3/8	FTKA0410	TW15S
NPD230-32-4	○	NPM(E)T222408-□□	23	32	44	92	116	60	176	PT1/4	FTKA02565	TW07S
NPD240-32-4	●	NPM(E)T222408-□□	24	32	44	96	120	60	180	PT1/4	FTKA02565	TW07S
NPD250-32-4	●	NPM(E)T252808-□□	25	32	44	100	125	60	185	PT1/4	FTKA0307	TW09S
NPD260-32-4	○	NPM(E)T252808-□□	26	32	44	104	129	60	189	PT1/4	FTKA0307	TW09S
NPD270-32-4	○	NPM(E)T252808-□□	27	32	44	108	134	60	194	PT1/4	FTKA0307	TW09S
NPD280-32-4	●	NPM(E)T252808-□□	28	32	44	112	139	60	199	PT1/4	FTKA0307	TW09S
NPD290-32-4	●	NPM(E)T293208-□□	29	32	44	116	143	60	203	PT1/4	FTKA0307	TW09S
NPD300-32-4	●	NPM(E)T293208-□□	30	32	44	120	149	60	209	PT1/4	FTKA0307	TW09S
NPD310-32-4	○	NPM(E)T293208-□□	31	32	44	124	153	60	213	PT1/4	FTKA0307	TW09S
NPD320-32-4	○	NPM(E)T293208-□□	32	32	44	128	157	60	217	PT1/4	FTKA0307	TW09S
NPD330-40-4	○	NPM(E)T334008-□□	33	40	48	132	164	70	234	PT3/8	FTKA03508	TW15S
NPD340-40-4	○	NPM(E)T334008-□□	34	40	48	136	168	70	238	PT3/8	FTKA03508	TW15S
NPD350-40-4	○	NPM(E)T334008-□□	35	40	48	140	172	70	242	PT3/8	FTKA03508	TW15S
NPD360-40-4	○	NPM(E)T334008-□□	36	40	48	144	177	70	247	PT3/8	FTKA03508	TW15S
NPD400-40-4	○	NPM(E)T334008-□□	40	40	48	160	195	70	265	PT3/8	FTKA03508	TW15S
NPD450-40-4	○	NPM(E)T415008-□□	45	40	58	180	219	70	289	PT3/8	FTKA0410	TW15S
NPD500-40-4	○	NPM(E)T415008-□□	50	40	58	200	242	70	312	PT3/8	FTKA0410	TW15S
NPD550-40-4	○	NPM(E)T516012-□□	55	40	68	220	266	70	336	PT3/8	FTNC04511	TW20S
NPD600-40-4	○	NPM(E)T516012-□□	60	40	68	240	292	70	362	PT3/8	FTNC04511	TW20S

●: Stock item, ○: Under preparing for stock

### SPD & NPD Code system



\*Use SPD for diameter Ø13mm~ Ø22mm, use NPD for diameter Ø23mm~ Ø60mm.

\*When choose drill, please take into consideration about the aspect ratio (flute length / hole diameter) of drill.

### How to calculate machining power of drilling : P(KW)

$$P = 425 \times K_s \times V \times f \times D / 10^7 (\text{KW})$$

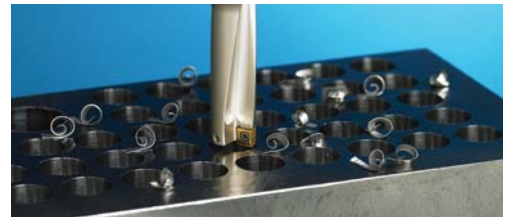
- Specific cutting force :  $K_s(\text{kg}/\text{mm}^2)$  see KORLOY catalogue
- Cutting speed :  $V(\text{m}/\text{min})$  Feed rate:  $f(\text{mm}/\text{rev})$  Drill diameter :  $\text{Ø}D(\text{mm})$

#### Example

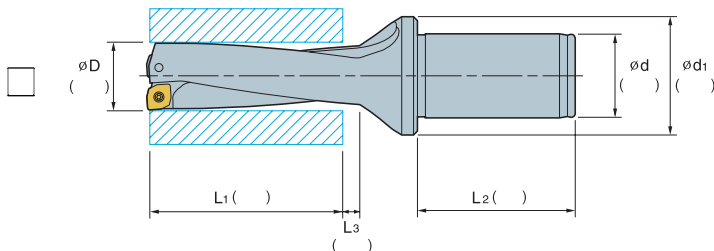
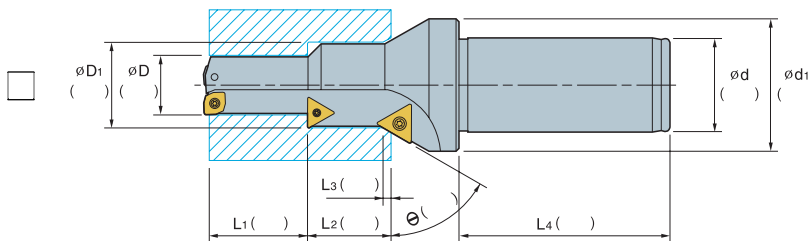
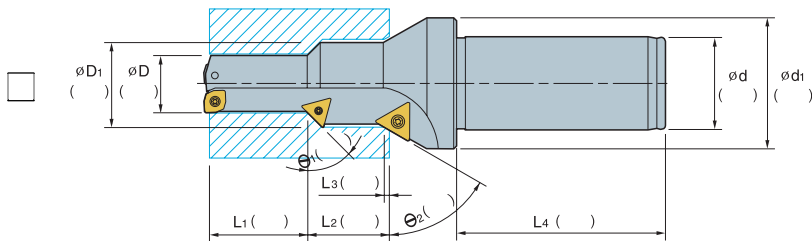
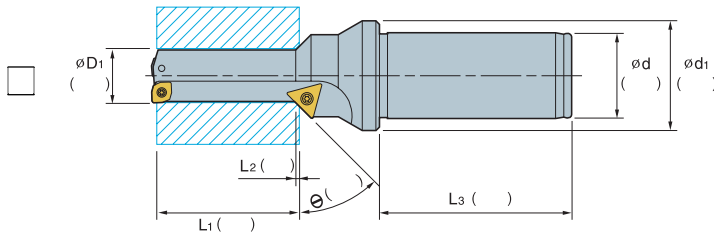
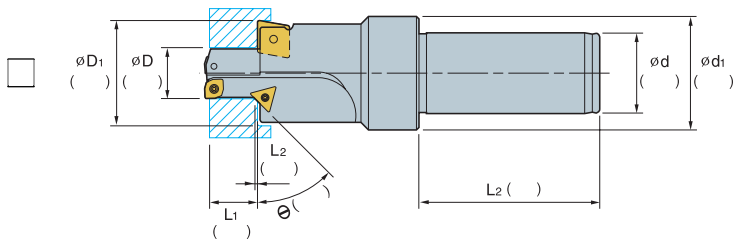
Workpiece = SCM440,  $K_s=254\text{kg}/\text{mm}^2$ ,  $V=100\text{m}/\text{min}$ ,  $f=0.1\text{mm}/\text{rev}$ ,  $D=20\text{mm}$

$P(\text{KW})=425 \times 254 \times 100 \times 0.1 \times 20 / 10,000,000=2.159\text{KW}$

# SPD & NPD special item order form



Customer : \_\_\_\_\_  Tel : \_\_\_\_\_  Person in charge : \_\_\_\_\_  
 Machine part : \_\_\_\_\_  Workpiece : \_\_\_\_\_  Order quantity : \_\_\_\_\_ pcs



## Coolant

- Through coolant
- Outer coolant(no oil hole)
- Side coolant(CNC)

## Machining type

- Blind hole
- Through hole

## Shank type

- F : Falt type
- W : Weldon type
- T : Whistle notch type

## Position of side lock flat

- General-Parallel with outer cutting edge line
- 90° with outer cutting edge line
- 150° with outer cutting edge line
- 180° with outer cutting edge line

## Note

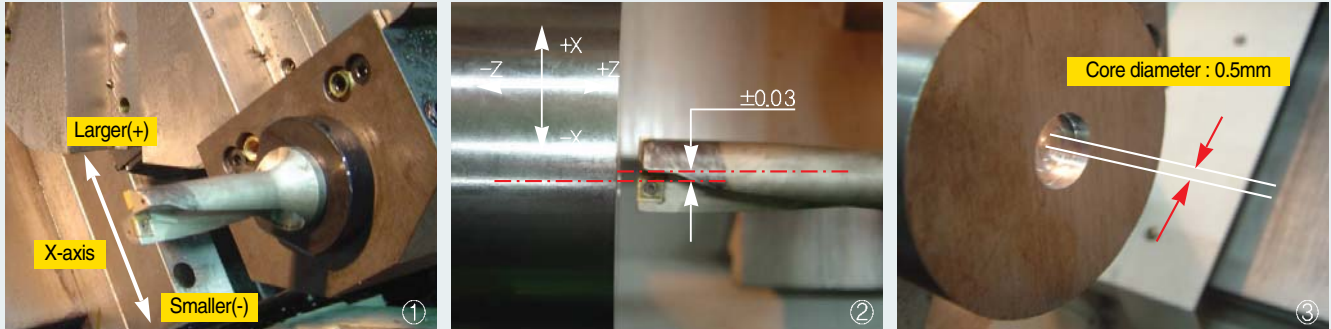
- Present tool
- Cutting condition
  - N(rpm) or V(m/min) :
  - F(mm/min) or f(mm/rev) :
  - Depth(mm) :
- Tool life
- Facilities
  - Machining center
  - General lathe
  - CNC lathe

※ Please fill out the requirement of tolerance for  $\varnothing D$ ,  $\varnothing D_1$



## Setting of drill in turning machine

### ● Setting of drill in turning machine



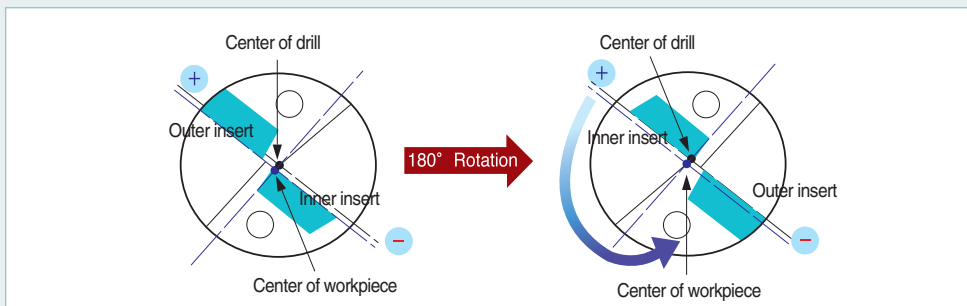
- ① The cutting edge of insert **should be parallel to X-axis** to make it possible to do offset cutting.  
Since a flat part on shank for side lock clamping has been made parallel with the cutting edge line of insert, operator can setting the drill as per flat part of shank.
- ② The outer insert should be located in the direction(+) of X-axis to allow for offset cutting and then **the inner insert should face the operator**.
- ③ To check up the setting of drill before use, test it by drilling about 5mm depth and then measure the core size if it is **around 0.5mm**.  
\* Please check the side lock position when you clamped

### ● Drill setting by core size

According to machine condition, miss-match between the center of the workpiece and the drill could cause un-preferable core size, like too big core or none. Since it is the main point to get good quality, please fully aware of the data written below.

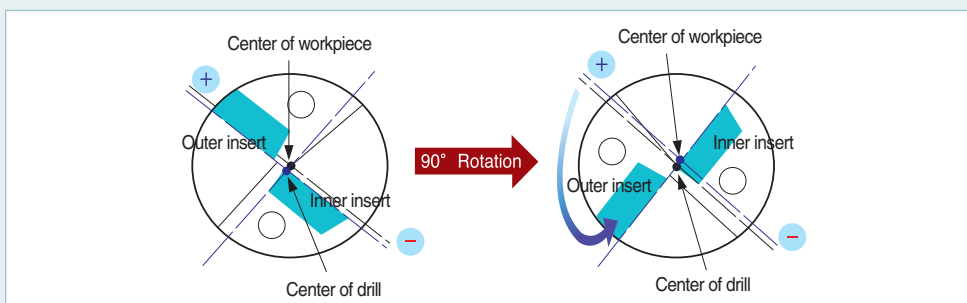
#### ■ When the core has not made

- ① It could cause damage on insert and serious vibration of tool in drilling.
- ② To fix the trouble, re-clamp it by rotate the holder 180° and check the core size again.

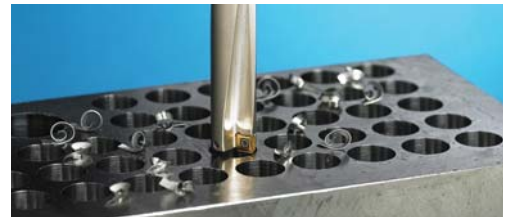


#### ■ When the core is larger than 1mm

- ① The big core of workpiece could generate big cutting force against drilling which cause vibration of tool .
- ② To figure out the trouble, rotate the drill 90° by counter-clockwise and re-clamp it.

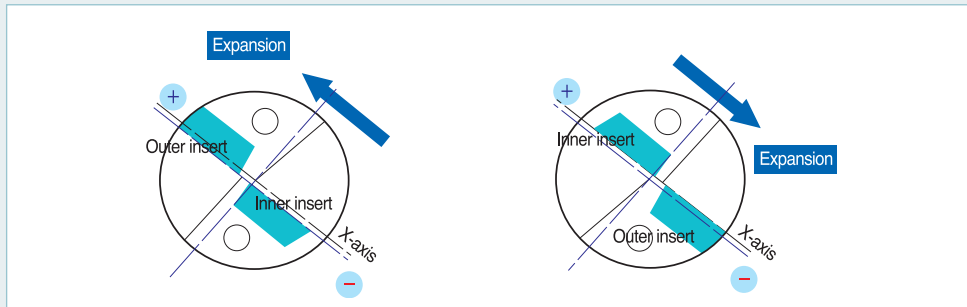


# User Guide For SPD & NPD



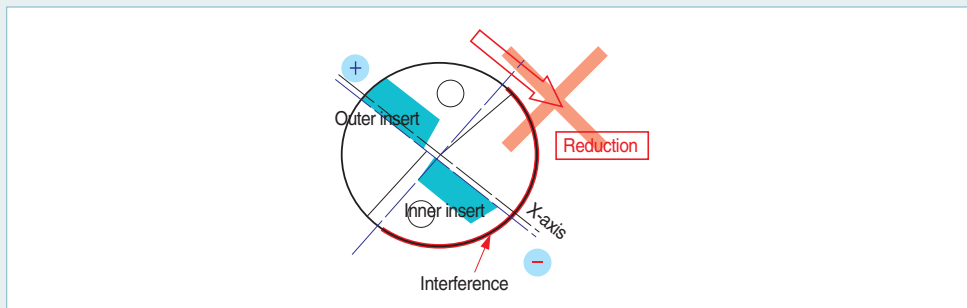
## ● Making expanded hole

- ① The cutting edge of insert and X-axis of machine should be parallel to each other.
- ② Expanding of hole size by moving the drill to the outer direction of X-axis is possible.  
(Please refer to the expanding hole range by drill diameter at the table shown below.)



- ③ Don't make the reduced operation in the inner direction of X-axis.

: A damage on workpiece could be caused by interference between drill's shank and operated hole.



## ● Maximum hole size available as per each drill diameter

: Expanded hole modification value when moving in the outer direction of X-axis.

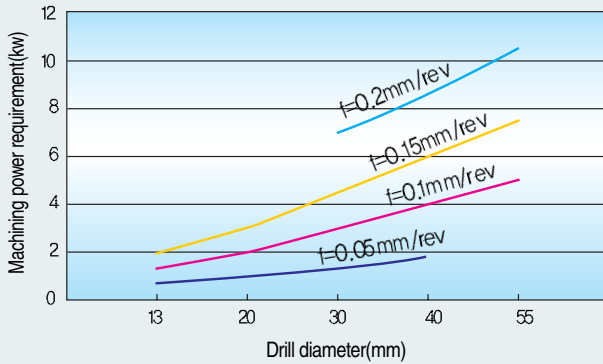
Drill diameter	Max.radial adjustment	Max.drill diameter	Drill diameter	Max.radial adjustment	Max.drill diameter	Drill diameter	Max.radial adjustment	Max.drill diameter
13	+ 0.3	13.6	29	+ 0.5	30.0	45	+ 0.5	46.0
14	+ 0.3	14.6	30	+ 0.5	31.0	46	+ 0.25	46.5
15	+ 0.3	15.6	31	+ 0.25	31.5	47	+ 0.25	47.5
16	+ 0.5	17.0	32	0	32.0	48	+ 0.25	48.5
17	+ 0.5	18.0	33	+ 0.5	34.0	49	0	49.0
18	+ 0.25	18.5	34	+ 0.5	35.0	50	0	50.0
19	+ 0.25	19.5	35	+ 0.5	36.0	51	+ 0.5	52.0
20	+ 0.5	21.0	36	+ 0.5	37.0	52	+ 0.5	53.0
21	+ 0.5	22.0	37	+ 0.5	38.0	53	+ 0.5	54.0
22	+ 0.25	22.5	38	+ 0.5	39.0	54	+ 0.5	55.0
23	+ 0.5	24.0	39	+ 0.5	40.0	55	+ 0.5	56.0
24	+ 0.25	24.5	40	+0.25	40.5	56	+0.5	57.0
25	+ 0.5	26.0	41	+0.5	42.0	57	+0.25	57.5
26	+ 0.5	27.0	42	+0.5	43.0	58	+0.25	58.5
27	+ 0.25	27.5	43	+0.5	44.0	59	0	59.0
28	0	28.0	44	+0.5	45.0	60	0	60.0

# User Guide For SPD & NPD



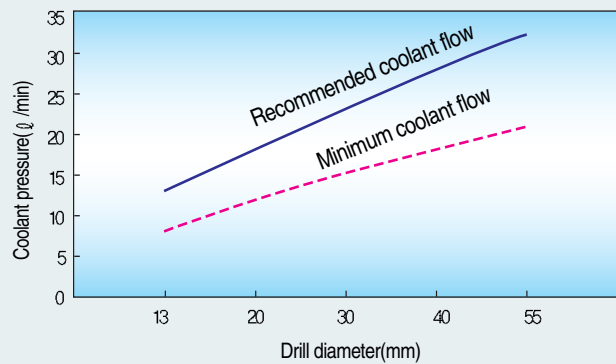
## SPD & NPD Technical information

### Machining power requirement



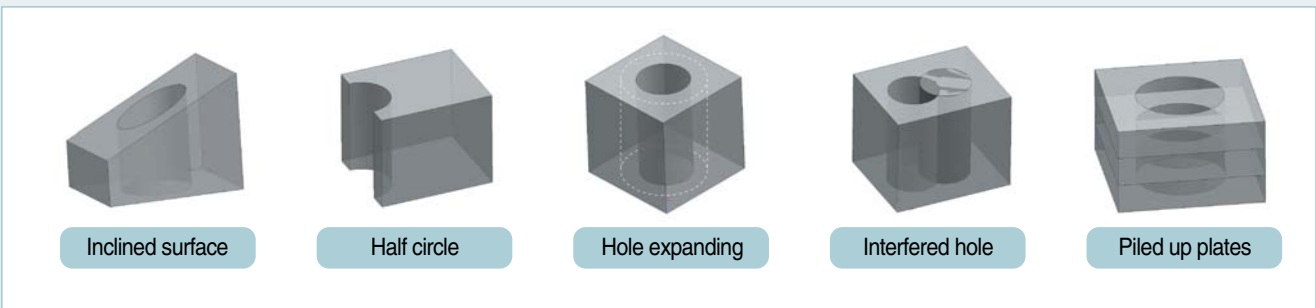
- This plot shows machine power requirement
- The power requirement is subject to change as per machine efficiency & damages on insert

### Coolant pressure



- Appropriate pressure for NPD & SPD is over 5kg/cm<sup>2</sup>
- Since the information shown above is basic data for normal drilling, adjustment as per workpiece & cutting conditions are necessary

### Applications need special care



\* In case of applications shown above, please decrease the feed rate 30~50% from the recommended data

### Trouble Shooting

Trouble	Condition	Cause	Solution
Size change of hole	Size change of the hole between inlet and outlet	Jammed chip	Increase 'Velocity' Decrease 'Feed rate'
Reduction of hole size	Reduction of hole size compare to drill diameter	Center position of workpiece is lower than cutting edge of inner insert.	Refer to the drill setting by core condition (Previous pages)
Scratching of steel part of holder by touching of wall of hole	Touch of the workpiece and the drill's shank	The Inaccurate center of workpiece and drill	
Vibration	Long Chip	Vibration happen due to poor chip evacuation.	<b>Soft steel, Stainless steel</b> Increase 'Velocity' Decrease 'Feed rate'
	Short Chip	Vibration happen due to the overload from severe chip breaking	<b>Alloy steel, Carbon steel</b> Increase 'Velocity' Increase 'Feed rate'
			Increase 'Velocity' Decrease 'Feed rate' Increase 'Coolant pressure'

\* Since the coolant pressure is very important factor for drilling, in-sufficient coolant pressure might cause shortened tool life by chattering or wear on cutting edge.

# User Guide For SPD & NPD



## Recommended cutting condition

Workpiece			C/B and Grade			Condition(L=3D)					
ISO	Material	Hardness (H <sub>B</sub> )		C/B	Grade	V	Feed(mm/rev) (ipr)				
						m/min sfm	Ø13~15	Ø16~24	Ø25~32	Ø33~40	Over Ø41
P	Low carbon steel	80-180	1st	DM	PC3535	190(130-250) 620(430-820)	0.04-0.08 0.0016-0.0032	0.04-0.08 0.0016-0.0032	0.05-0.08 0.0020-0.0040	0.05-0.10 0.0020-0.0040	0.08-0.12 0.0032-0.0048
			2nd	DS	PC9530	170(110-230) 560(360-760)	0.04-0.08 0.0016-0.0032	0.04-0.08 0.0016-0.0032	0.05-0.08 0.0020-0.0040	0.05-0.10 0.0020-0.0040	0.08-0.12 0.0032-0.0048
	High carbon steel	180-280	1st	DM	PC3535	140(80-200) 460(260-660)	0.04-0.10 0.0016-0.0040	0.04-0.12 0.0016-0.0048	0.05-0.16 0.0020-0.0063	0.08-0.18 0.0032-0.0071	0.10-0.22 0.0040-0.0087
			Low alloy steel	140-260	1st	DM	PC3535	130(70-200) 430(230-660)	0.04-0.10 0.0016-0.0040	0.06-0.12 0.0024-0.0048	0.10-0.16 0.0040-0.0063
	2nd	DS			PC9530	120(50-180) 400(160-590)	0.04-0.10 0.0016-0.0040	0.06-0.13 0.0024-0.0052	0.10-0.18 0.0040-0.0071	0.11-0.20 0.0043-0.0080	0.13-0.25 0.0050-0.0098
	Low alloy steel (heat)	20-400	1st	DM	PC3535	90(40-150) 300(130-490)	0.04-0.10 0.0016-0.0040	0.04-0.12 0.0016-0.0048	0.06-0.16 0.0024-0.0063	0.10-0.20 0.0040-0.0080	0.12-0.22 0.0048-0.0087
			2nd	DR	PC3535	80(40-140) 260(130-460)	0.04-0.10 0.0016-0.0040	0.04-0.12 0.0016-0.0048	0.06-0.16 0.0024-0.0063	0.10-0.20 0.0040-0.0080	0.12-0.22 0.0048-0.0087
	High alloy steel	50-260	1st	DM	PC3535	100(50-160) 330(160-530)	0.04-0.08 0.0016-0.0032	0.04-0.12 0.0016-0.0048	0.08-0.16 0.0032-0.0063	0.10-0.18 0.0040-0.0071	0.12-0.22 0.0048-0.0087
			2nd	DS	PC9530	90(50-150) 300(160-490)	0.04-0.08 0.0016-0.0032	0.04-0.12 0.0016-0.0048	0.08-0.16 0.0032-0.0063	0.10-0.18 0.0040-0.0071	0.12-0.22 0.0048-0.0087
	High alloy steel (heat)	220-450	1st	DM	PC3535	70(30-120) 230(100-400)	0.04-0.10 0.0016-0.0040	0.04-0.12 0.0016-0.0048	0.06-0.14 0.0024-0.0056	0.08-0.16 0.0032-0.0063	0.10-0.20 0.0040-0.0080
			2nd	DR	PC3535	60(30-110) 200(100-360)	0.04-0.10 0.0016-0.0040	0.04-0.12 0.0016-0.0048	0.06-0.14 0.0024-0.0056	0.08-0.16 0.0032-0.0063	0.10-0.20 0.0040-0.0080
	M	Austenite	135-275 Ni > 8%	1st	DS	PC9530	100(50-150) 330(160-490)	0.04-0.10 0.0016-0.0040	0.04-0.12 0.0016-0.0048	0.06-0.14 0.0024-0.0056	0.08-0.16 0.0032-0.0063
2nd				DM	PC9530	90(40-150) 300(130-490)	0.04-0.10 0.0016-0.0040	0.04-0.12 0.0016-0.0048	0.06-0.14 0.0024-0.0056	0.08-0.16 0.0032-0.0063	0.10-0.20 0.0040-0.0080
Austenite (Cast steel)		150-250	1st	DS	PC9530	80(40-130) 260(130-430)	0.04-0.10 0.0016-0.0040	0.04-0.12 0.0016-0.0048	0.06-0.14 0.0024-0.0056	0.08-0.16 0.0032-0.0063	0.10-0.18 0.0040-0.0071
			2nd	DM	PC9530	80(40-120) 260(130-400)	0.04-0.10 0.0016-0.0040	0.04-0.12 0.0016-0.0048	0.06-0.14 0.0024-0.0056	0.08-0.16 0.0032-0.0063	0.10-0.18 0.0040-0.0071

### Machined hole tolerance as per D.O.C.

D.O.C.	Machined hole tolerance
2 X D	D <sup>+0.2</sup> / <sub>-0.1</sub> (mm)
3 X D	D <sup>+0.3</sup> / <sub>-0.1</sub> (mm)
4 X D	D <sup>+0.4</sup> / <sub>-0.1</sub> (mm)

- Above tolerance is general data under variety of machining factors.  
 - Under preferable conditions, tolerance under 0.05mm could be achieved.

### Test cutting condition

	Metric	Inch
V	130~200 m/min	430~660 sfm
f	0.04~0.15 mm/rev	0.0016~0.006 ipr
Work piece	42 CrMo4	AISI4140

## User Guide For SPD &amp; NPD



## Recommended cutting condition

Workpiece			C/B and Grade			Condition(L=3D)					
ISO	Material	Hardness (H <sub>B</sub> )		C/B	Grade	V	Feed(mm/rev) (ipr)				
						m/min sfm	Ø13~15	Ø16~24	Ø25~32	Ø33~40	Over Ø41
M	Ferrite Marten site	135-275	1st	DR	PC3535	120(60-170) 400(200-560)	0.04-0.10	0.04-0.14	0.06-0.18	0.08-0.20	0.12-0.22
			2nd	DS	PC9530	110(60-160) 360(200-530)	0.04-0.10	0.04-0.14	0.06-0.18	0.08-0.20	0.12-0.22
	Ni-alloy	130-400	1st	DS	PC9530	50(30-100) 160(100-330)	0.04-0.06	0.04-0.08	0.06-0.10	0.08-0.12	0.08-0.15
			2nd	DM	PC9530	40(30-90) 130(100-300)	0.04-0.06	0.04-0.08	0.06-0.10	0.08-0.12	0.08-0.15
	Ti-alloy	130-400	1st	DR	PC3535	50(30-90) 160(100-300)	0.04-0.08	0.04-0.10	0.06-0.12	0.08-0.14	0.08-0.16
	High hardness	400-	1st	DR	PC3535	40(20-80) 130(65-260)	0.04-0.08	0.04-0.10	0.06-0.12	0.08-0.14	0.08-0.16
K	Gray	150-220	1st	DM	PC6510	190(150-250) 620(490-820)	0.04-0.12	0.06-0.16	0.08-0.18	0.10-0.22	0.12-0.26
	Ductile	130-240	1st	DM	PC6510	150(100-200) 490(330-660)	0.04-0.10	0.05-0.14	0.06-0.16	0.08-0.20	0.10-0.22
			2nd	DR	PC6510	130(90-180) 430(300-590)	0.04-0.10	0.05-0.14	0.06-0.16	0.08-0.20	0.10-0.22
	Graphite	200-300	1st	DM	PC6510	130(70-170) 430(230-560)	0.04-0.10	0.05-0.12	0.06-0.16	0.08-0.18	0.10-0.20
			2nd	DR	PC6510	110(70-150) 360(230-490)	0.04-0.10	0.05-0.12	0.06-0.16	0.08-0.18	0.10-0.20
	N	Aluminum	30-150	1st	DA	H01	300(200-400) 990(660-1320)	0.04-0.12	0.06-0.16	0.08-0.18	0.10-0.22
2nd				DM	H01	280(200-350) 920(660-1150)	0.04-0.12	0.06-0.16	0.08-0.18	0.10-0.22	0.12-0.26
Copper		150-160	1st	DA	H01	280(200-350) 920(660-1150)	0.04-0.10	0.06-0.16	0.08-0.18	0.10-0.22	0.12-0.26
			2nd	DM	H01	250(200-300) 820(660-990)	0.04-0.10	0.06-0.16	0.08-0.18	0.10-0.22	0.12-0.26

### ● Application tips

1. Decrease feed rate 20~30% when using aspect ratio 4D drill.  
(You may increase feed rate 10~20% when using aspect ratio 2D drill)
2. Apply appropriate cutting condition according to workpiece shape and hardness.
3. Decrease feed rate 30~50% when overlapped board drilling.
4. Decrease feed rate 20~30% when poor workpiece clamping and low rigidity of machine.
5. Decrease feed rate 30~50% early in the operation when inclined surface drilling.  
(In case of bad chip evacuation, apply step drilling of change to longer drill)
7. When hole expanding, adjust cutting speed and feed rate.  
(It may cause long chip)



Warning

\* Safety instruction

- Do not touch the tools with bare hand.
- Wear safety glasses or face cover.
- Make appropriate tool substitution.
- Be careful when you handle hot and acute chips. Use special tools for chip removal.
- Be equipped with fire extinguisher in case of fire.
- Clamp workpiece tightly.
- Apply recommended cutting condition for your safe and efficient operation.