SHAPER DUO

Socket hole machining | CNC automatic lathes

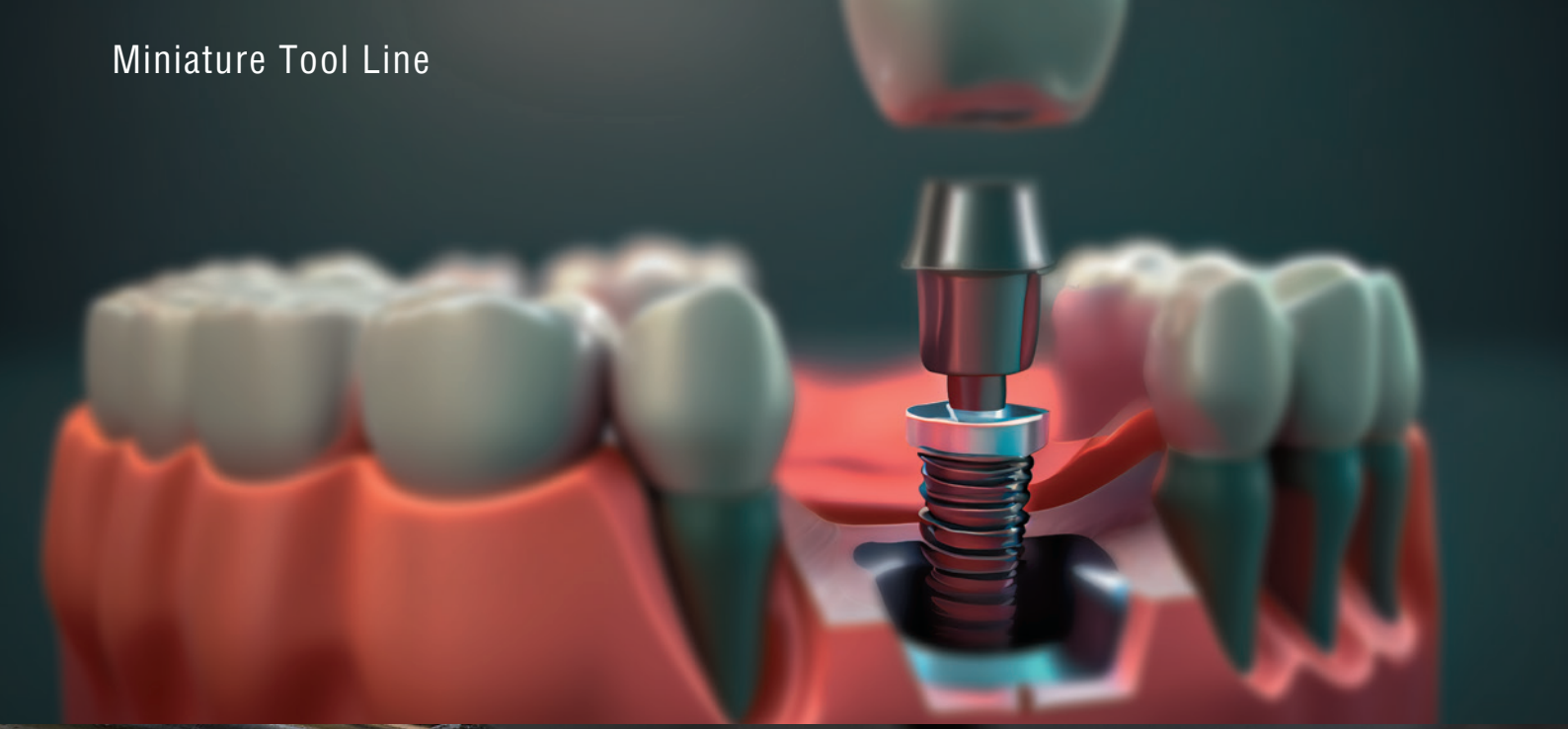
Member IMC Group
NTK CUTTING TOOLS

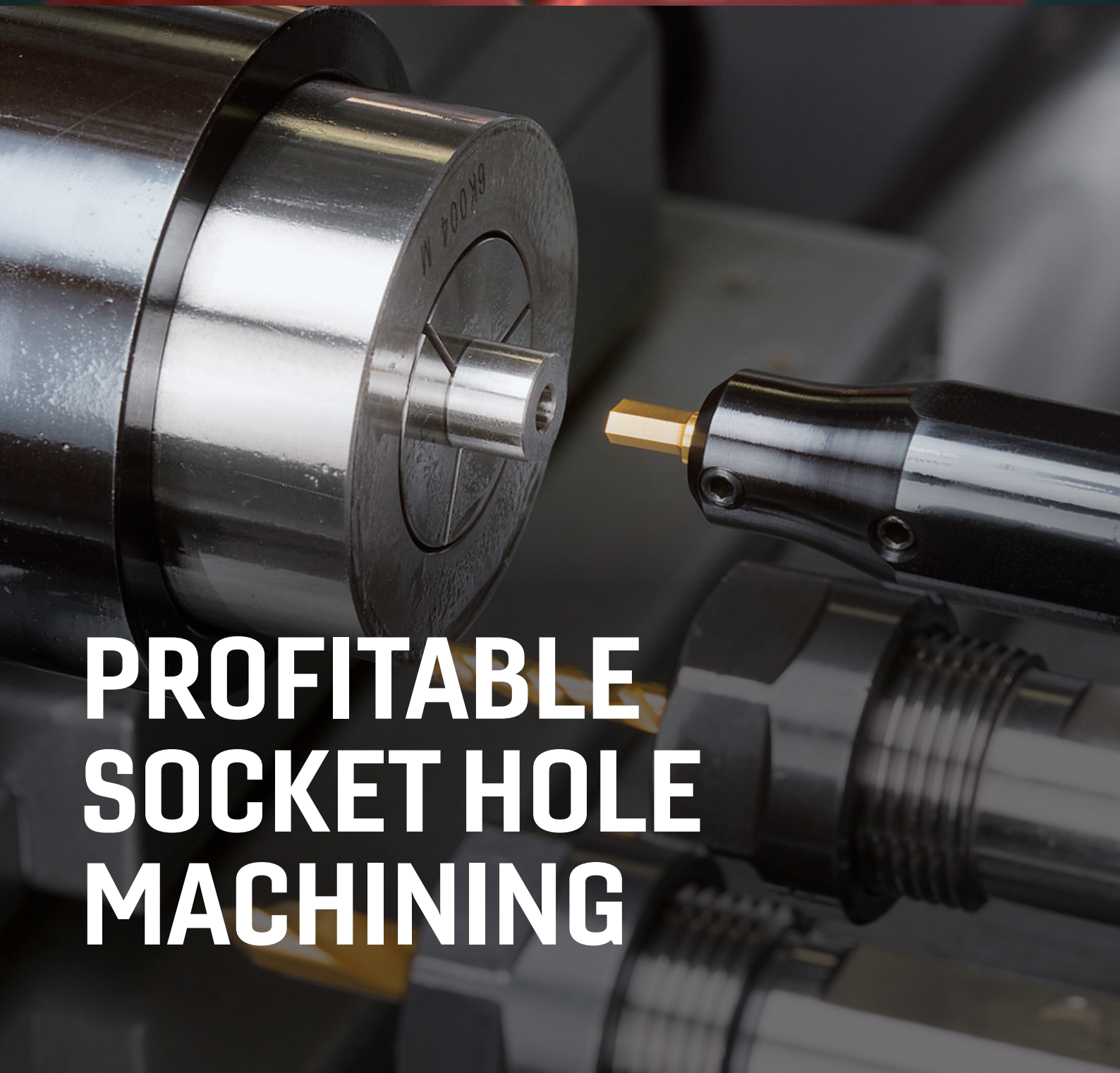
New Line up

For medical parts (Abutment screws)
Hexagon socket : AF 1,0mm - 1,4mm

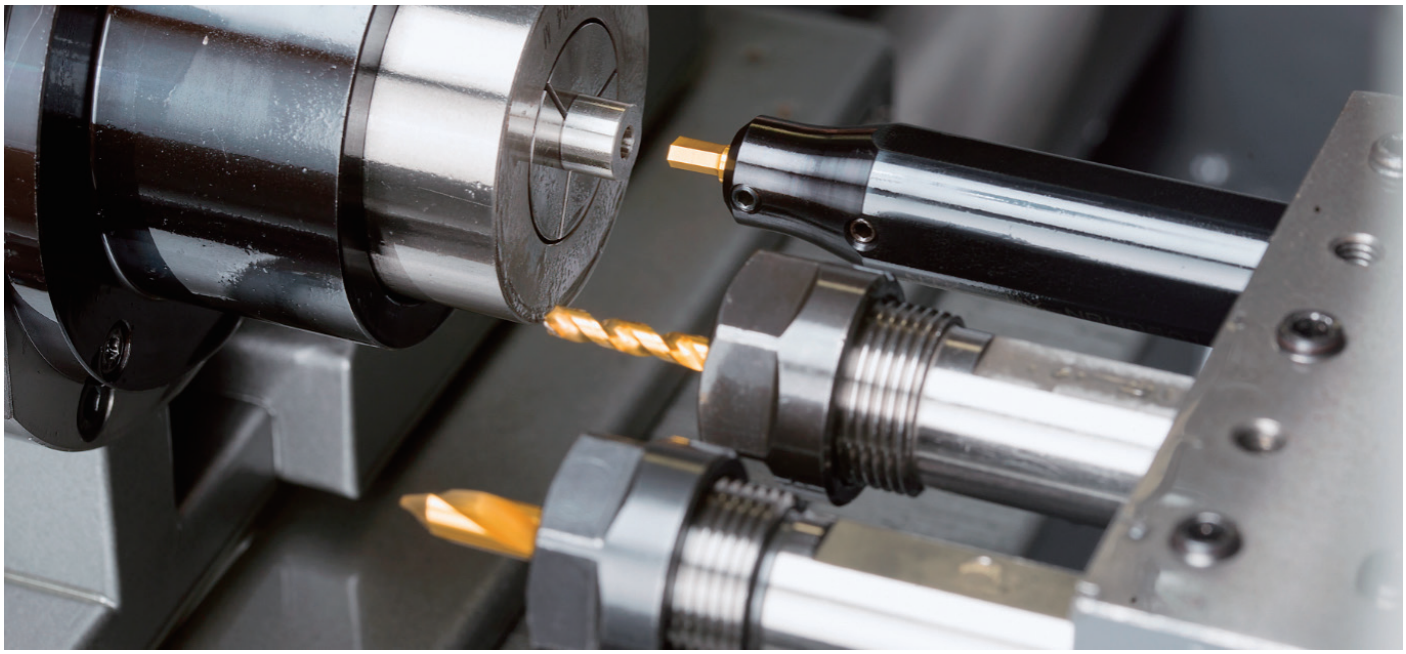
CERtainly [but not only] CERamics
Outstanding solutions for demanding applications

Miniature Tool Line





PROFITABLE SOCKET HOLE MACHINING



For socket hole machining on CNC automatic lathes

SHAPER DUO

Hexagon, square and hexalobular socket machining can be achieved at a low cost and without any special equipment .

Wide range of socket styles and sizes can be machined by using the sub-spindle of automatic lathes.

Features ①

- Machine square, hexagon, and hexalobular socket holes
- Less tool pressure than Rotary-Broaching. Ideal for machining small diameter work pieces
- Wide range of socket dimensions can be machined with one size of SHAPER DUO
- Special workpieces and small quantity part runs can be machined with less tool costs

Features ②

Comparison Chart of Hexalobular Socket Machining

	Tool Pressure	Cycle Time	Tool Cost	High speed spindle	Programming	
Shaper Duo	◎	◎	◎	Not necessary	Simple	• No high speed spindle needed • A lot less cycle time
End mill	○	×	△	Necessary	Complicated	• Need high speed spindle • Time consuming process

***Small diameter end mill driven by high-speed spindle is popular way to create Hexalobular(6-lobe) socket.**
It has some flexibility but needs high speed spindle unit and it is a time consuming process.
***SHAPER DUO can make Hexalobular(6-lobe) socket faster and simpler.**

Comparison Chart of HEX Socket Machining

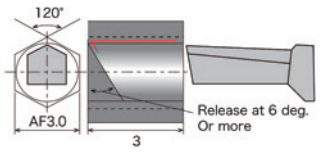
	Tool Pressure	Cycle Time	Flexibility	Tool Cost	
Shaper Duo	◎	△ ※Can be off-set by over-wrapping operation	○	◎	• Less tool pressure-especially on small diameter parts • One size can cover several socket sizes
Broach Tool	△	○	×	△	• Need to have tools for each socket size

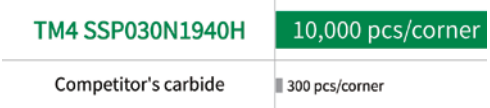
***Rotary-broaching is an efficient way to machine a Hexagon socket.**
But tool pressure is high and often times it pushes part too hard.
***SHAPER DUO system enables less tool pressure and provides better tolerance with less cost.**

Example of machining Hexagon socket

SHAPER DUO has better tool life compared to the competitor which has an immediate worn and rounded cutting edge.
NTK's special grinding process and TM4 grade enable to:
① Keep good corner edge sharpness and long tool life ② Provide better tolerance and accuracy ③ Provide better surface quality

Work materials	SUS303
Feed	2,000 mm/min
Depth of cut (ap)	Roughing 0.025mm
	Finishing 0.005mm
Coolant	WET

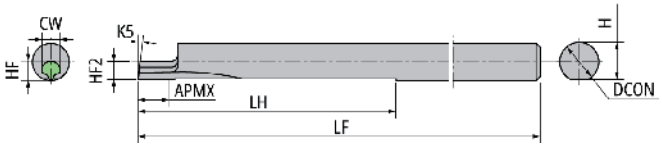


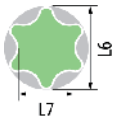


Insert bar

Hexalobular socket (6-LOBE hole)

SSP-T

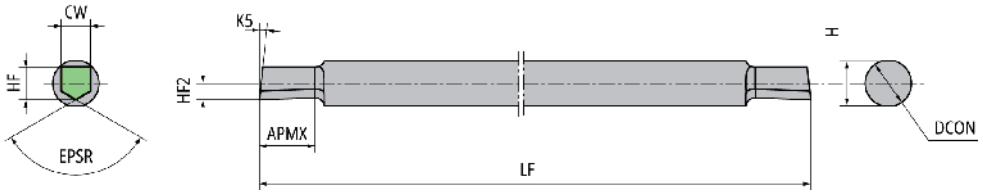




Item Number	Socket size	Socket number	L6 mm	L7 mm	Recommended Pilot bore Dia. mm	APMX mm	CW mm	DCON mm	H mm	HF mm	HF2 mm	K5 °	LF mm	LH nn	Carbide PVD coating TM4
SSP050N25T06	T6	6	1.75	1.27	1.15	2.5	1.2	5	4.75	1.09	2.4	6	70	35	●
SSP050N31T07	T7	7	2.1	1.5	1.38	3.1	1.4	5	4.75	1.29	2.4	6	70	35	●
SSP050N36T08	T8	8	2.4	1.75	1.62	3.6	1.6	5	4.75	1.5	2.4	6	70	35	●
SSP050N41T10	T10	10	2.8	2.05	1.92	4.1	1.8	5	4.75	1.7	2.4	6	70	35	●
SSP050N43T15	T15	15	3.35	2.4	2.3	4.3	2.2	5	4.75	2.1	2.4	6	70	35	●
SSP050N46T20	T20	20	3.95	2.85	2.71	4.6	2.6	5	4.75	2.5	2.4	6	70	35	●
SSP050N50T25	T25	25	4.5	3.25	3.13	5	3	5	4.75	2.9	2.4	6	70	35	●
SSP050N55T27	T27	27	5.1	3.68	3.52	5.5	3.4	5	4.75	3.3	2.4	6	70	35	●
SSP050N55T30	T30	30	5.6	4.05	3.91	5.5	3.8	5	4.75	3.7	2.4	6	70	35	●

Hexagon socket

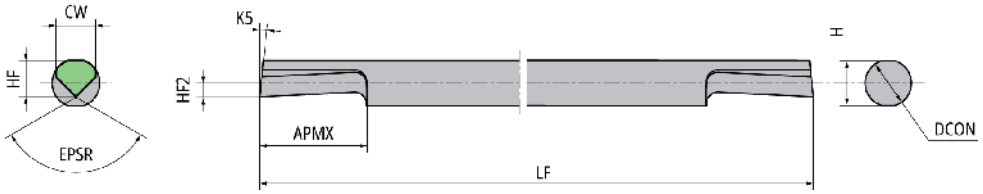
SSP-H

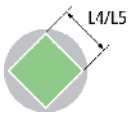


Item Number	Base AF L4 mm	AF range L5 mm	APMX mm	CW mm	DCON mm	EPSR °	H mm	HF mm	HF2 mm	K5 °	LF mm	Carbide PVD coating TM4
SSP020N06515H	1	1-1.1	1.5	0.65	2	120	1.8	0.7	0.35	15	50	●
SSP020N07018H	1.1	1.1-1.2	1.8	0.7	2	120	1.8	0.8	0.4	15	50	●
SSP020N07518H	1.2	1.2-1.3	1.8	0.75	2	120	1.8	0.9	0.45	15	50	●
SSP020N08020H	1.3	1.3-1.4	2	0.8	2	120	1.8	1	0.5	15	50	●
SSP020N1130H	1.5	1.4-1.9	3	1.1	2	120	1.8	0.9	0.45	6	50	●
SSP020N1430H	2	1.8-2.5	3	1.4	2	120	1.8	1.2	0.6	6	50	●
SSP030N1940H	3	2.3-3.5	4	1.9	3	120	2.8	1.5	0.75	6	50	●
SSP040N2450H	4	3.3-4.5	5	2.4	4	120	3.8	2.5	1.25	6	60	●
SSP050N3260H	5	4.3-6.1	6	3.2	5	120	4.8	3.3	1.65	6	70	●
SSP060N42120H	6	5.3-8.1	12	4.2	6	120	5.6	4	2	6	80	●
SSP080N62160H	8	7.3-12.1	16	6.2	8	120	7.6	4.9	2.45	6	80	●

Square Socket

SSP-S



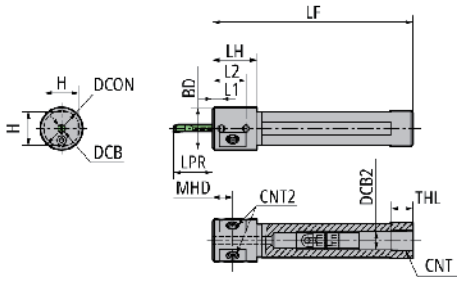


Item Number	Base AF L4 mm	AF range L5 mm	APMX mm	CW mm	DCON mm	EPSR °	H mm	HF mm	HF2 mm	K5 °	LF mm	Carbide PVD coating TM4
SSP020N1740S	2	2-2.3	4	1.7	2	90	1.8	1.6	0.7	6	50	●
SSP025N1940S	2.5	2.3-2.6	4	1.95	2.5	90	2.3	1.8	0.65	6	50	●
SSP030N2260S	3	2.6-3	6	2.2	3	90	2.8	2.05	0.65	6	50	●
SSP035N2760S	3.5	2.9-3.7	6	2.7	3.5	90	3.3	2.25	0.6	6	60	●
SSP040N3380S	4	3.7-4.5	8	3.35	4	90	3.8	3.05	1.15	6	60	●
SSP050N39100S	5	4.5-5.3	10	3.9	5	90	4.8	3.95	1.55	6	70	●
SSP060N47120S	6	5.3-6.5	12	4.75	6	90	5.6	4.5	1.7	6	80	●
SSP080N58160S	8	6.5-8	16	5.8	8	90	7.6	5.5	1.7	6	80	●

STICK DUO SPLASH

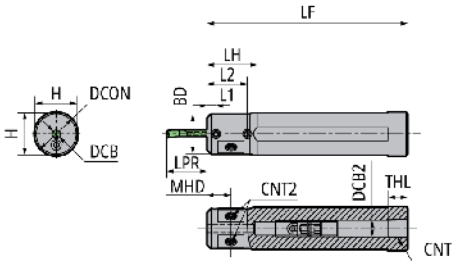
Sleeve for Shaper Duo series (Adjustable overhang / Internal coolant system)

HY-NBH-OH Shank diameter Φ16



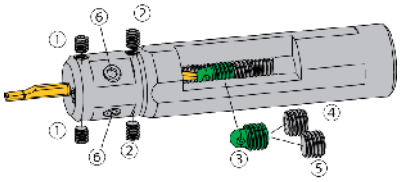
EDP	Item Number	Stock	BD mm	CNT	CNT2	DCB mm	DCB2 mm	DCON mm	H mm	LF mm	LH mm	LPR mm	L1 mm	L2 mm	MHD mm	THL mm	Applicable insert bar	
5893011	**HY-NBH02016G-OH**	●	19	Rc1/8	M6×P1.0	2	8.2	16	15	90	19	5-18	4	15	9.5	10	SBF../SHF..	SSP..
5893029	**HY-NBH02516G-OH**	●	19	Rc1/8	M6×P1.0	2.5	8.2	16	15	90	19	6.3-19.5	4	15	9.5	10	SBF../SHF..	SBT../SSP..
5893037	**HY-NBH03016G-OH**	●	19	Rc1/8	M6×P1.0	3	8.2	16	15	90	19	7.5-21	4	15	9.5	10	SBF../SHF../SBB..	SBG../SBT../SSP..
5893045	**HY-NBH03516G-OH**	●	19	Rc1/8	M6×P1.0	3.5	8.2	16	15	90	19	8.8-24.5	4	15	9.5	10	SBF../SHF..	SBT../SSP..
5893052	**HY-NBH04016G-OH**	●	19	Rc1/8	M6×P1.0	4	8.2	16	15	90	24	10-28	4	20	12	10	SBF../SHF../SBB..	SBG../SBT../SSP..
5893060	**HY-NBH05016G-OH**	●	19	Rc1/8	M6×P1.0	5	8.2	16	15	90	24	12.5-35	4	20	12	10	SBF../SHF..	SBG../SBT../SSP..

HY-NBH-OH Shank diameter Φ19.05 - Φ25.4



EDP	Item Number	Stock	BD mm	CNT	CNT2	DCB mm	DCB2 mm	DCON mm	H mm	LF mm	LH mm	LPR mm	L1 mm	L2 mm	MHD mm	THL mm	Applicable insert bar	
5893078	**HY-NBH02019J-OH**	●	19.05	Rc1/8	M6×P1.0	2	8.2	19.05	18	110	–	5-18	4	15	9.5	10	SBF../SHF..	SSP..
5893086	**HY-NBH02519J-OH**	●	19.05	Rc1/8	M6×P1.0	2.5	8.2	19.05	18	110	–	6.3-19.5	4	15	9.5	10	SBF../SHF..	SBT../SSP..
5893094	**HY-NBH03019J-OH**	●	19.05	Rc1/8	M6×P1.0	3	8.2	19.05	18	110	–	7.5-21	4	15	9.5	10	SBF../SHF../SBB..	SBG../SBT../SSP..
5893102	**HY-NBH03519J-OH**	●	19.05	Rc1/8	M6×P1.0	3.5	8.2	19.05	18	110	–	8.8-24.5	4	15	9.5	10	SBF../SHF..	SBT../SSP..
5893136	**HY-NBH04019J-OH**	●	19.05	Rc1/8	M6×P1.0	4	8.2	19.05	18	110	–	10-28	4	20	12	10	SBF../SHF../SBB..	SBG../SBT../SSP..
5893144	**HY-NBH05019J-OH**	●	19.05	Rc1/8	M6×P1.0	5	8.2	19.05	18	110	–	12.5-35	4	20	12	10	SBF../SHF..	SBG../SBT../SSP..
5967922	**HY-NBH06019J-OH**	●	19.05	Rc1/8	M6×P1.0	6	8.2	19.05	18	110	–	15-42	4	20	12	10	SBF../SHF..	SBG../SFG../SBT../SSP..
5893151	**HY-NBH02020J-OH**	●	20	Rc1/8	M6×P1.0	2	8.2	20	19	110	–	5-18	4	15	9.5	10	SBF../SHF..	SSP..
5893169	**HY-NBH02520J-OH**	●	20	Rc1/8	M6×P1.0	2.5	8.2	20	19	110	–	6.3-19.5	4	15	9.5	10	SBF../SHF..	SBT../SSP..
5893177	**HY-NBH03020J-OH**	●	20	Rc1/8	M6×P1.0	3	8.2	20	19	110	–	7.5-21	4	15	9.5	10	SBF../SHF../SBB..	SBG../SBT../SSP..
5893185	**HY-NBH03520J-OH**	●	20	Rc1/8	M6×P1.0	3.5	8.2	20	19	110	–	8.8-24.5	4	15	9.5	10	SBF../SHF..	SBT../SSP..
5893193	**HY-NBH04020J-OH**	●	20	Rc1/8	M6×P1.0	4	8.2	20	19	110	–	10-28	4	20	12	10	SBF../SHF../SBB..	SBG../SBT../SSP..
5893201	**HY-NBH05020J-OH**	●	20	Rc1/8	M6×P1.0	5	8.2	20	19	110	–	12.5-35	4	20	12	10	SBF../SHF..	SBG../SBT../SSP..
5967930	**HY-NBH06020J-OH**	●	20	Rc1/8	M6×P1.0	6	8.2	20	19	110	–	15-42	4	20	12	10	SBF../SHF..	SBG../SFG../SBT../SSP..
5893219	**HY-NBH02022X-OH**	●	20	Rc1/8	M6×P1.0	2	8.2	22	21	120	25	5-18	4	15	9.5	10	SBF../SHF..	SSP..
5893227	**HY-NBH02522X-OH**	●	20	Rc1/8	M6×P1.0	2.5	8.2	22	21	120	25	6.3-19.5	4	15	9.5	10	SBF../SHF..	SBT../SSP..
5893235	**HY-NBH03022X-OH**	●	20	Rc1/8	M6×P1.0	3	8.2	22	21	120	25	7.5-21	4	15	9.5	10	SBF../SHF../SBB..	SBG../SBT../SSP..
5893243	**HY-NBH03522X-OH**	●	20	Rc1/8	M6×P1.0	3.5	8.2	22	21	120	25	8.8-24.5	4	15	9.5	10	SBF../SHF..	SBT../SSP..
5893250	**HY-NBH04022X-OH**	●	20	Rc1/8	M6×P1.0	4	8.2	22	21	120	25	10-28	4	20	12	10	SBF../SHF../SBB..	SBG../SBT../SSP..
5893268	**HY-NBH05022X-OH**	●	20	Rc1/8	M6×P1.0	5	8.2	22	21	120	25	12.5-35	4	20	12	10	SBF../SHF..	SBG../SBT../SSP..
5967948	**HY-NBH06022X-OH**	●	20	Rc1/8	M6×P1.0	6	8.2	22	21	120	25	15-42	4	20	12	10	SBF../SHF..	SBG../SFG../SBT../SSP..
5893276	**HY-NBH02025.0K-OH**	●	20	Rc1/8	M6×P1.0	2	8.2	25	24	125	25	5-18	4	15	9.5	10	SBF../SHF..	SSP..
5893284	**HY-NBH02525.0K-OH**	●	20	Rc1/8	M6×P1.0	2.5	8.2	25	24	125	25	6.3-19.5	4	15	9.5	10	SBF../SHF..	SBT../SSP..
5893292	**HY-NBH03025.0K-OH**	●	20	Rc1/8	M6×P1.0	3	8.2	25	24	125	25	7.5-21	4	15	9.5	10	SBF../SHF../SBB..	SBG../SBT../SSP..
5893300	**HY-NBH03525.0K-OH**	●	20	Rc1/8	M6×P1.0	3.5	8.2	25	24	125	25	8.8-24.5	4	15	9.5	10	SBF../SHF..	SBT../SSP..
5893318	**HY-NBH04025.0K-OH**	●	20	Rc1/8	M6×P1.0	4	8.2	25	24	125	25	10-28	4	20	12	10	SBF../SHF../SBB..	SBG../SBT../SSP..
5893326	**HY-NBH05025.0K-OH**	●	20	Rc1/8	M6×P1.0	5	8.2	25	24	125	25	12.5-35	4	20	12	10	SBF../SHF..	SBG../SBT../SSP..
5967955	**HY-NBH06025.0K-OH**	●	20	Rc1/8	M6×P1.0	6	8.2	25	24	125	25	15-42	4	20	12	10	SBF../SHF..	SBG../SFG../SBT../SSP..
5893334	**HY-NBH02025.4K-OH**	●	20	Rc1/8	M6×P1.0	2	8.2	25.4	24	125	25	5-18	4	15	9.5	10	SBF../SHF..	SSP..
5893367	**HY-NBH02525.4K-OH**	●	20	Rc1/8	M6×P1.0	2.5	8.2	25.4	24	125	25	6.3-19.5	4	15	9.5	10	SBF../SHF..	SBT../SSP..
5893375	**HY-NBH03025.4K-OH**	●	20	Rc1/8	M6×P1.0	3	8.2	25.4	24	125	25	7.5-21	4	15	9.5	10	SBF../SHF../SBB..	SBG../SBT../SSP..
5893383	**HY-NBH03525.4K-OH**	●	20	Rc1/8	M6×P1.0	3.5	8.2	25.4	24	125	25	8.8-24.5	4	15	9.5	10	SBF../SHF..	SBT../SSP..
5893391	**HY-NBH04025.4K-OH**	●	20	Rc1/8	M6×P1.0	4	8.2	25.4	24	125	25	10-28	4	20	12	10	SBF../SHF../SBB..	SBG../SBT../SSP..
5893409	**HY-NBH05025.4K-OH**	●	20	Rc1/8	M6×P1.0	5	8.2	25.4	24	125	25	12.5-35	4	20	12	10	SBF../SHF..	SBG../SBT../SSP..
5967963	**HY-NBH06025.4K-OH**	●	20	Rc1/8	M6×P1.0	6	8.2	25.4	24	125	25	15-42	4	20	12	10	SBF../SHF..	SBG../SFG../SBT../SSP..

Parts

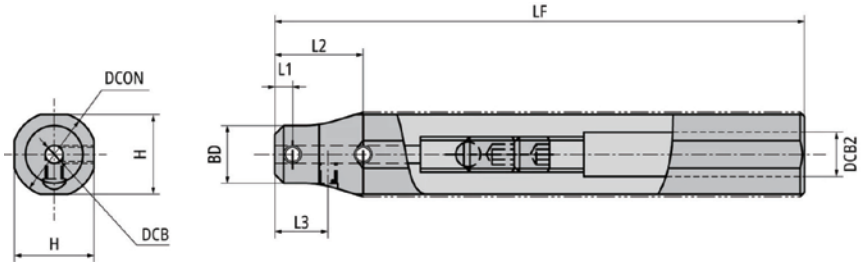


Item Number	Clamp Screw		Overhang Adjustment			M6 Screw	Wrench		
	①	②	③	④	⑤	⑥	for①②	for③④⑤	for⑥
HY-NBH02016G-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH02516G-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH03016G-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH03516G-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH04016G-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH05016G-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH02019J-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH02519J-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH03019J-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH03519J-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH04019J-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH05019J-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH06019J-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH02020J-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH02520J-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH03020J-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH03520J-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH04020J-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH05020J-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH06020J-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH02022X-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH02522X-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH03022X-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH03522X-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH04022X-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH05022X-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH06022X-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH02025.0K-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH02525.0K-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH03025.0K-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH03525.0K-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH04025.0K-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH05025.0K-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH06025.0K-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH02025.4K-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH02525.4K-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH03025.4K-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH03525.4K-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH04025.4K-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH05025.4K-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
HY-NBH06025.4K-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3

STICK DUO HYPER

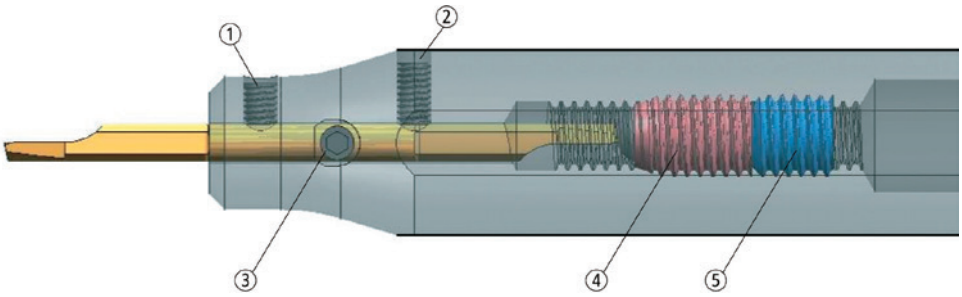
Sleeve for Shaper Duo series (Adjustable overhang)

HY-NBH



EDP	Item Number	Stock	BD mm	DCB mm	DCB2 mm	DCON mm	H mm	LF mm	L1 mm	L2 mm	L3 mm	Applicable insert bar	
5709894	**HY-NBH02016H**	●	11	2	10	16	15	100	4	15	9.5	SBF../SHF..	SSP..
5709902	**HY-NBH02516H**	●	11.5	2.5	10	16	15	100	4	15	9.5	SBF../SHF..	SBT../SSP..
5709910	**HY-NBH03016H**	●	12	3	10	16	15	100	4	15	9.5	SBF../SHF../SBB..	SBG../SBT../SSP..
5709936	**HY-NBH03516H**	●	12.5	3.5	10	16	15	100	4	20	12	SBF../SHF..	SBT../SSP..
5709944	**HY-NBH04016H**	●	13	4	10	16	15	100	4	20	12	SBF../SHF../SBB..	SBG../SBT../SSP..
5709951	**HY-NBH05016H**	●	14	5	10	16	15	100	4	20	12	SBF../SHF..	SBG../SBT../SSP..
5709969	**HY-NBH02019K**	●	11	2	10	19.05	18	125	4	15	9.5	SBF../SHF..	SSP..
5709977	**HY-NBH02519K**	●	11.5	2.5	10	19.05	18	125	4	15	9.5	SBF../SHF..	SBT../SSP..
5709985	**HY-NBH03019K**	●	12	3	10	19.05	18	125	4	15	9.5	SBF../SHF../SBB..	SBG../SBT../SSP..
5709993	**HY-NBH03519K**	●	12.5	3.5	10	19.05	18	125	4	20	12	SBF../SHF..	SBT../SSP..
5710009	**HY-NBH04019K**	●	13	4	10	19.05	18	125	4	20	12	SBF../SHF../SBB..	SBG../SBT../SSP..
5710017	**HY-NBH05019K**	●	14	5	10	19.05	18	125	4	20	12	SBF../SHF..	SBG../SBT../SSP..
5712708	**HY-NBH02020K**	●	11	2	10	20	19	125	4	15	9.5	SBF../SHF..	SSP..
5712716	**HY-NBH02520K**	●	11.5	2.5	10	20	19	125	4	15	9.5	SBF../SHF..	SBT../SSP..
5712724	**HY-NBH03020K**	●	12	3	10	20	19	125	4	15	9.5	SBF../SHF../SBB..	SBG../SBT../SSP..
5712740	**HY-NBH03520K**	●	12.5	3.5	10	20	19	125	4	20	12	SBF../SHF..	SBT../SSP..
5712757	**HY-NBH04020K**	●	13	4	10	20	19	125	4	20	12	SBF../SHF../SBB..	SBG../SBT../SSP..
5712765	**HY-NBH05020K**	●	14	5	10	20	19	125	4	20	12	SBF../SHF..	SBG../SBT../SSP..
5712773	**HY-NBH02022K**	●	11	2	10	22	21	125	4	15	9.5	SBF../SHF..	SSP..
5712799	**HY-NBH02522K**	●	11.5	2.5	10	22	21	125	4	15	9.5	SBF../SHF..	SBT../SSP..
5712831	**HY-NBH03022K**	●	12	3	10	22	21	125	4	15	9.5	SBF../SHF../SBB..	SBG../SBT../SSP..
5712856	**HY-NBH03522K**	●	12.5	3.5	10	22	21	125	4	20	12	SBF../SHF..	SBT../SSP..
5712872	**HY-NBH04022K**	●	13	4	10	22	21	125	4	20	12	SBF../SHF../SBB..	SBG../SBT../SSP..
5712914	**HY-NBH05022K**	●	14	5	10	22	21	125	4	20	12	SBF../SHF..	SBG../SBT../SSP..
5712732	**HY-NBH02025K-MET**	●	11	2	10	25	24	125	4	15	9.5	SBF../SHF..	SSP..
5712823	**HY-NBH02525K-MET**	●	11.5	2.5	10	25	24	125	4	15	9.5	SBF../SHF..	SBT../SSP..
5712849	**HY-NBH03025K-MET**	●	12	3	10	25	24	125	4	15	9.5	SBF../SHF../SBB..	SBG../SBT../SSP..
5712864	**HY-NBH03525K-MET**	●	12.5	3.5	10	25	24	125	4	20	12	SBF../SHF..	SBT../SSP..
5712898	**HY-NBH04025K-MET**	●	13	4	10	25	24	125	4	20	12	SBF../SHF../SBB..	SBG../SBT../SSP..
5712922	**HY-NBH05025K-MET**	●	14	5	10	25	24	125	4	20	12	SBF../SHF..	SBG../SBT../SSP..
5713003	**HY-NBH02025K**	●	11	2	10	25.4	24	125	4	15	9.5	SBF../SHF..	SSP..
5713029	**HY-NBH02525K**	●	11.5	2.5	10	25.4	24	125	4	15	9.5	SBF../SHF..	SBT../SSP..
5713045	**HY-NBH03025K**	●	12	3	10	25.4	24	125	4	15	9.5	SBF../SHF../SBB..	SBG../SBT../SSP..
5713060	**HY-NBH03525K**	●	12.5	3.5	10	25.4	24	125	4	20	12	SBF../SHF..	SBT../SSP..
5713086	**HY-NBH04025K**	●	13	4	10	25.4	24	125	4	20	12	SBF../SHF../SBB..	SBG../SBT../SSP..
5713102	**HY-NBH05025K**	●	14	5	10	25.4	24	125	4	20	12	SBF../SHF..	SBG../SBT../SSP..

Parts

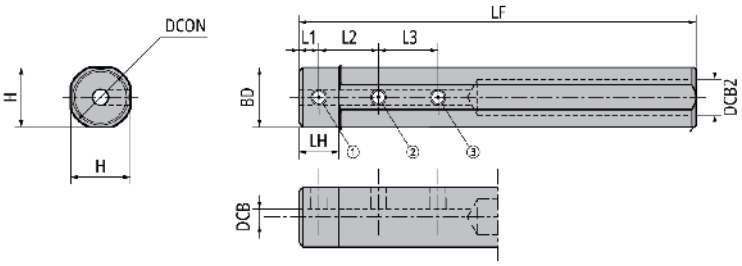


Item Number	Clamp Screw			Overhang Adjustment		Wrench	
	①	②	③	④	⑤	for①②③	for④⑤
HY-NBH02016H	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH02516H	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH03016H	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH03516H	SS04045FS	SS0404F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH04016H	SS04045FS	SS0404F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH05016H	SS04045FS	SS0404F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH02019K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH02519K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH03019K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH03519K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH04019K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH05019K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH02020K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH02520K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH03020K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH03520K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH04020K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH05020K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH02022K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH02522K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH03022K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH03522K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH04022K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH05022K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH02025K-MET	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH02525K-MET	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH03025K-MET	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH03525K-MET	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH04025K-MET	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH05025K-MET	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH02025K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH02525K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH03025K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH03525K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH04025K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104
HY-NBH05025K	SS04045FS	SS0406F	SS0404F	SS0812R	SS0808F	LW-2	LW-4*104

STICK DUO

Sleeve for Shaper Duo series

NBH Shank diameter Φ15.875 - Φ19.05



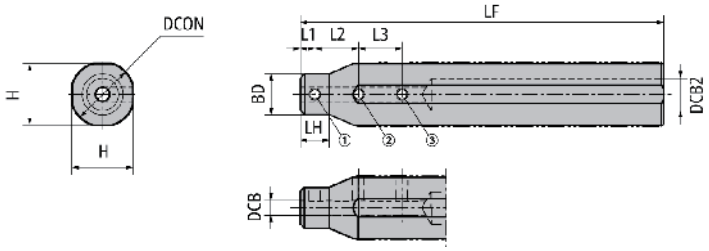
EDP	Item Number	Stock	BD	DCB	DCB2	DCON	H	LF	LH	L1	L2	L3	Applicable insert bar	
			mm	mm	mm	mm	mm	mm	mm	mm	mm	mm		
5631403	**NBH02015H**	●	15	2	9	15.875	15	100	10	5	10	–	SBF../SHF..	SSP..
5702915	**NBH02515H**	●	15	2.5	9	15.875	15	100	10	5	10	–	SBF../SHF..	SBT../SSP..
5631411	**NBH03015H**	●	15	3	9	15.875	15	100	10	5	10	10	SBF../SHF../SBB..	SBG../SBT../SSP..
5586110	**NBH03515H**	●	15	3.5	9	15.875	15	100	10	5	10	10	SBF../SHF..	SBT../SSP..
5586128	**NBH04015H**	●	15	4	9	15.875	15	100	10	5	15	15	SBF../SHF../SBB..	SBG../SBT../SSP..
5585997	**NBH04515H**	●	15	4.5	9	15.875	15	100	10	5	15	15	–	–
5585989	**NBH05015H**	●	15	5	9	15.875	15	100	10	5	15	15	SBF../SHF..	SBG../SBT../SSP..
5585971	**NBH06015H**	●	15	6	9	15.875	15	100	10	5	20	20	SBF../SHF..	SBG../SFG../SBT../SSP..
5585963	**NBH08015H**	●	15	8	9	15.875	15	100	10	5	20	20	SBF../SHF..	SBG../SFG../SSP..
5631429	**NBH02016H**	●	15	2	9	16	15	100	10	5	10	–	SBF../SHF..	SSP..
5702899	**NBH02516H**	●	15	2.5	9	16	15	100	10	5	10	–	SBF../SHF..	SBT../SSP..
5631437	**NBH03016H**	●	15	3	9	16	15	100	10	5	10	10	SBF../SHF../SBB..	SBG../SBT../SSP..
5586102	**NBH03516H**	●	15	3.5	9	16	15	100	10	5	10	10	SBF../SHF..	SBT../SSP..
5586094	**NBH04016H**	●	15	4	9	16	15	100	10	5	15	15	SBF../SHF../SBB..	SBG../SBT../SSP..
5586086	**NBH04516H**	●	15	4.5	9	16	15	100	10	5	15	15	–	–
5586078	**NBH05016H**	●	15	5	9	16	15	100	10	5	15	15	SBF../SHF..	SBG../SBT../SSP..
5586060	**NBH06016H**	●	15	6	9	16	15	100	10	5	20	20	SBF../SHF..	SBG../SFG../SBT../SSP..
5774195	**NBH07016H**	●	15	7	9	16	15	100	10	5	20	20	SBF../SHF..	–
5586052	**NBH08016H**	●	15	8	9	16	15	100	10	5	20	20	SBF../SHF..	SBG../SFG../SSP..
5631445	**NBH02019K**	●	18	2	11	19.05	18	125	10	5	10	–	SBF../SHF..	SSP..
5702907	**NBH02519K**	●	18	2.5	11	19.05	18	125	10	5	10	–	SBF../SHF..	SBT../SSP..
5631452	**NBH03019K**	●	18	3	11	19.05	18	125	10	5	10	10	SBF../SHF../SBB..	SBG../SBT../SSP..
5586045	**NBH03519K**	●	18	3.5	11	19.05	18	125	10	5	10	10	SBF../SHF..	SBT../SSP..
5586037	**NBH04019K**	●	18	4	11	19.05	18	125	10	5	15	15	SBF../SHF../SBB..	SBG../SBT../SSP..
5586029	**NBH04519K**	●	18	4.5	11	19.05	18	125	10	5	15	15	–	–
5586011	**NBH05019K**	●	18	5	11	19.05	18	125	10	5	15	15	SBF../SHF..	SBG../SBT../SSP..
5586003	**NBH06019K**	●	18	6	11	19.05	18	125	10	5	20	20	SBF../SHF..	SBG../SFG../SBT../SSP..
5774203	**NBH07019K**	●	18	7	11	19.05	18	125	10	5	20	20	SBF../SHF..	–
5586227	**NBH08019K**	●	18	8	11	19.05	18	125	10	5	20	20	SBF../SHF..	SBG../SFG../SSP..
5586219	**NBH10019K**	●	18	10	11	19.05	18	125	10	5	20	20	–	–

Parts

Item Number	Clamp Screw			Wrench for①②③
	①	②	③	
NBH02015H	SS0406F	SS0406F	–	LW-2
NBH02515H	SS0406F	SS0406F	–	LW-2
NBH03015H	SS0404F	SS0404F	SS0404F	LW-2
NBH03515H	SS0404F	SS0404F	SS0404F	LW-2
NBH04015H	SS0404F	SS0404F	SS0404F	LW-2
NBH04515H	SS0404F	SS0404F	SS0404F	LW-2
NBH05015H	SS0404F	SS0404F	SS0404F	LW-2
NBH06015H	SS0404F	SS0404F	SS0404F	LW-2
NBH08015H	SS0403F	SS0403F	SS0403F	LW-2
NBH02016H	SS0406F	SS0406F	–	LW-2
NBH02516H	SS0406F	SS0406F	–	LW-2
NBH03016H	SS0404F	SS0404F	SS0404F	LW-2
NBH03516H	SS0404F	SS0404F	SS0404F	LW-2
NBH04016H	SS0404F	SS0404F	SS0404F	LW-2
NBH04516H	SS0404F	SS0404F	SS0404F	LW-2
NBH05016H	SS0404F	SS0404F	SS0404F	LW-2
NBH06016H	SS0404F	SS0404F	SS0404F	LW-2
NBH07016H	SS0403F	SS0404F	SS0404F	LW-2
NBH08016H	SS0403F	SS0403F	SS0403F	LW-2
NBH02019K	SS0408F	SS0408F	–	LW-2
NBH02519K	SS0408F	SS0408F	–	LW-2
NBH03019K	SS0406F	SS0406F	SS0406F	LW-2
NBH03519K	SS0406F	SS0406F	SS0406F	LW-2
NBH04019K	SS0406F	SS0406F	SS0406F	LW-2
NBH04519K	SS0406F	SS0406F	SS0406F	LW-2
NBH05019K	SS0406F	SS0406F	SS0406F	LW-2
NBH06019K	SS0406F	SS0406F	SS0406F	LW-2
NBH07019K	SS0404F	SS0404F	SS0404F	LW-2
NBH08019K	SS0404F	SS0404F	SS0404F	LW-2
NBH10019K	SS0403F	SS0404F	SS0404F	LW-2

STICK DUO
Sleeve for Shaper Duo series

NBH Shank diameter Φ20 - Φ32



EDP	Item Number	Stock	BD mm	DCB mm	DCB2 mm	DCON mm	H mm	LF mm	LH mm	L1 mm	L2 mm	L3 mm	Applicable insert bar	
5631460	**NBH02020K**	●	11	2	11	20	19	125	10	5	10	–	SBF../SHF..	SSP..
5702881	**NBH02520K**	●	11	2.5	11	20	19	125	10	5	10	–	SBF../SHF..	SBT../SSP..
5631478	**NBH03020K**	●	12	3	11	20	19	125	10	5	10	10	SBF../SHF../SBB..	SBG../SBT../SSP..
5586201	**NBH03520K**	●	12	3.5	11	20	19	125	10	5	10	10	SBF../SHF..	SBT../SSP..
5586185	**NBH04020K**	●	13	4	11	20	19	125	10	5	15	15	SBF../SHF../SBB..	SBG../SBT../SSP..
5586177	**NBH04520K**	●	13	4.5	11	20	19	125	10	5	15	15	–	–
5586169	**NBH05020K**	●	14	5	11	20	19	125	10	5	15	15	SBF../SHF..	SBG../SBT../SSP..
5586151	**NBH06020K**	●	15	6	11	20	19	125	10	5	20	20	SBF../SHF..	SBG../SFG../SBT../SSP..
5774211	**NBH07020K**	●	16	7	11	20	19	125	10	5	20	20	SBF../SHF..	–
5586144	**NBH08020K**	●	17	8	11	20	19	125	10	5	20	20	SBF../SHF..	SBG../SFG../SSP..
5586136	**NBH10020K**	●	19	10	11	20	19	125	10	5	20	20	–	–
5914742	**NBH12020K**	●	19	12	14	20	19	125	10	5	25	25	–	–
5631486	**NBH02022K**	●	11	2	11	22	21	125	10	5	10	–	SBF../SHF..	SSP..
5702873	**NBH02522K**	●	11	2.5	11	22	21	125	10	5	10	–	SBF../SHF..	SBT../SSP..
5631494	**NBH03022K**	●	12	3	11	22	21	125	10	5	10	10	SBF../SHF../SBB..	SBG../SBT../SSP..
5586326	**NBH03522K**	●	12	3.5	11	22	21	125	10	5	10	10	SBF../SHF..	SBT../SSP..
5586318	**NBH04022K**	●	13	4	11	22	21	125	10	5	15	15	SBF../SHF../SBB..	SBG../SBT../SSP..
5586300	**NBH04522K**	●	13	4.5	11	22	21	125	10	5	15	15	–	–
5586292	**NBH05022K**	●	14	5	11	22	21	125	10	5	15	15	SBF../SHF..	SBG../SBT../SSP..
5586284	**NBH06022K**	●	15	6	11	22	21	125	10	5	20	20	SBF../SHF..	SBG../SFG../SBT../SSP..
5774229	**NBH07022K**	●	16	7	11	22	21	125	10	5	20	20	SBF../SHF..	–
5586276	**NBH08022K**	●	17	8	11	22	21	125	10	5	20	20	SBF../SHF..	SBG../SFG../SSP..
5586268	**NBH10022K**	●	19	10	11	22	21	125	10	5	20	20	–	–
5631502	**NBH12022K**	●	21	12	14	22	21	125	10	5	25	25	–	–
5631510	**NBH02023K**	●	11	2	11	23	21	125	10	5	10	–	SBF../SHF..	SSP..
5702857	**NBH02523K**	●	11	2.5	11	23	21	125	10	5	10	–	SBF../SHF..	SBT../SSP..
5631528	**NBH03023K**	●	12	3	11	23	21	125	10	5	10	10	SBF../SHF../SBB..	SBG../SBT../SSP..
5586250	**NBH03523K**	●	12	3.5	11	23	21	125	10	5	10	10	SBF../SHF..	SBT../SSP..
5651336	**NBH04023K**	●	13	4	11	23	21	125	10	5	15	15	SBF../SHF../SBB..	SBG../SBT../SSP..
5586243	**NBH04523K**	●	13	4.5	11	23	21	125	10	5	15	15	–	–
5631536	**NBH05023K**	●	14	5	11	23	21	125	10	5	15	15	SBF../SHF..	SBG../SBT../SSP..
5631544	**NBH06023K**	●	15	6	11	23	21	125	10	5	20	20	SBF../SHF..	SBG../SFG../SBT../SSP..
5631551	**NBH08023K**	●	17	8	11	23	21	125	10	5	20	20	SBF../SHF..	SBG../SFG../SSP..
5631569	**NBH10023K**	●	19	10	11	23	21	125	10	5	20	20	–	–
5631577	**NBH12023K**	●	21	12	14	23	21	125	10	5	25	25	–	–
5631585	**NBH02025K-MET**	●	11	2	11	25	24	125	10	5	10	–	SBF../SHF..	SSP..
5704283	**NBH02525K-MET**	●	11	2.5	11	25	24	125	10	5	10	–	SBF../SHF..	SBT../SSP..
5631593	**NBH03025K-MET**	●	12	3	11	25	24	125	10	5	10	10	SBF../SHF../SBB..	SBG../SBT../SSP..
5631601	**NBH03525K-MET**	●	12	3.5	11	25	24	125	10	5	10	10	SBF../SHF..	SBT../SSP..
5651328	**NBH04025K-MET**	●	13	4	11	25	24	125	10	5	15	15	SBF../SHF../SBB..	SBG../SBT../SSP..
5631619	**NBH04525K-MET**	●	13	4.5	11	25	24	125	10	5	15	15	–	–
5631627	**NBH05025K-MET**	●	14	5	11	25	24	125	10	5	15	15	SBF../SHF..	SBG../SBT../SSP..
5631635	**NBH06025K-MET**	●	15	6	11	25	24	125	10	5	20	20	SBF../SHF..	SBG../SFG../SBT../SSP..
5774252	**NBH07025K-MET**	●	16	7	11	25	24	125	10	5	20	20	SBF../SHF..	–
5631643	**NBH08025K-MET**	●	17	8	11	25	24	125	10	5	20	20	SBF../SHF..	SBG../SFG../SSP..
5631650	**NBH10025K-MET**	●	19	10	11	25	24	125	10	5	20	20	–	–
5631668	**NBH12025K-MET**	●	21	12	14	25	24	125	10	5	25	25	–	–
5631676	**NBH02025K**	●	11	2	11	25.4	24	125	10	5	10	–	SBF../SHF..	SSP..
5702865	**NBH02525K**	●	11	2.5	11	25.4	24	125	10	5	10	–	SBF../SHF..	SBT../SSP..
5631684	**NBH03025K**	●	12	3	11	25.4	24	125	10	5	10	10	SBF../SHF../SBB..	SBG../SBT../SSP..
5586235	**NBH03525K**	●	12	3.5	11	25.4	24	125	10	5	10	10	SBF../SHF..	SBT../SSP..
5586383	**NBH04025K**	●	13	4	11	25.4	24	125	10	5	15	15	SBF../SHF../SBB..	SBG../SBT../SSP..
5586375	**NBH04525K**	●	13	4.5	11	25.4	24	125	10	5	15	15	–	–
5586367	**NBH05025K**	●	14	5	11	25.4	24	125	10	5	15	15	SBF../SHF..	SBG../SBT../SSP..
5586359	**NBH06025K**	●	15	6	11	25.4	24	125	10	5	20	20	SBF../SHF..	SBG../SFG../SBT../SSP..
5774260	**NBH07025K**	●	16	7	11	25.4	24	125	10	5	20	20	SBF../SHF..	–
5586342	**NBH08025K**	●	17	8	11	25.4	24	125	10	5	20	20	SBF../SHF..	SBG../SFG../SSP..
5586334	**NBH10025K**	●	19	10	11	25.4	24	125	10	5	20	20	–	–

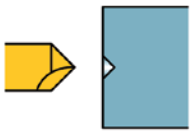
EDP	Item Number	Stock	BD mm	DCB mm	DCB2 mm	DCON mm	H mm	LF mm	LH mm	L1 mm	L2 mm	L3 mm	Applicable insert bar	
5631692	**NBH12025K**	●	21	12	14	25.4	24	125	10	5	25	25	–	–
5939475	**NBH04532K**	●	13	4.5	11	32	30	125	10	5	15	15	–	–
5939483	**NBH05032K**	●	14	5	11	32	30	125	10	5	15	15	SBF../SHF..	SBG../SBT../SSP..
5939491	**NBH06032K**	●	15	6	11	32	30	125	10	5	20	20	SBF../SHF..	SBG../SFG../SBT../SSP..
5939509	**NBH07032K**	●	16	7	11	32	30	125	10	5	20	20	SBF../SHF..	–
5939525	**NBH08032K**	●	17	8	11	32	30	125	10	5	20	20	SBF../SHF..	SBG../SFG../SSP..
5939533	**NBH10032K**	●	19	10	11	32	30	125	10	5	20	20	–	–
5939467	**NBH12032K**	●	21	12	14	32	30	125	10	5	25	25	–	–
5939459	**NBH14032K**	●	23	14	16	32	30	125	10	5	25	25	–	–
5939442	**NBH16032K**	●	25	16	18	32	30	125	10	5	25	25	–	–

Parts

Item Number	Clamp Screw			Wrench for①②③
	①	②	③	
NBH02020K	SS0404F	SS0404F	–	LW-2
NBH02520K	SS0404F	SS0404F	–	LW-2
NBH03020K	SS0404F	SS0404F	SS0406F	LW-2
NBH03520K	SS0404F	SS0404F	SS0406F	LW-2
NBH04020K	SS0404F	SS0406F	SS0406F	LW-2
NBH04520K	SS0404F	SS0406F	SS0406F	LW-2
NBH05020K	SS0404F	SS0406F	SS0406F	LW-2
NBH06020K	SS0404F	SS0406F	SS0406F	LW-2
NBH07020K	SS0404F	SS0406F	SS0406F	LW-2
NBH08020K	SS0404F	SS0404F	SS0404F	LW-2
NBH10020K	SS0404F	SS0404F	SS0404F	LW-2
NBH12020K	SS0403F	SS0403F	SS0403F	LW-2
NBH02022K	SS0404F	SS0406F	–	LW-2
NBH02522K	SS0404F	SS0406F	–	LW-2
NBH03022K	SS0404F	SS0406F	SS0408F	LW-2
NBH03522K	SS0404F	SS0406F	SS0406F	LW-2
NBH04022K	SS0404F	SS0406F	SS0406F	LW-2
NBH04522K	SS0404F	SS0406F	SS0406F	LW-2
NBH05022K	SS0404F	SS0406F	SS0406F	LW-2
NBH06022K	SS0404F	SS0406F	SS0406F	LW-2
NBH07022K	SS0404F	SS0406F	SS0406F	LW-2
NBH08022K	SS0404F	SS0406F	SS0406F	LW-2
NBH10022K	SS0404F	SS0404F	SS0404F	LW-2
NBH12022K	SS0404F	SS0404F	SS0404F	LW-2
NBH02023K	SS0404F	SS0406F	–	LW-2
NBH02523K	SS0404F	SS0406F	–	LW-2
NBH03023K	SS0404F	SS0406F	SS0408F	LW-2
NBH03523K	SS0404F	SS0406F	SS0406F	LW-2
NBH04023K	SS0404F	SS0406F	SS0406F	LW-2
NBH04523K	SS0404F	SS0406F	SS0406F	LW-2
NBH05023K	SS0404F	SS0406F	SS0406F	LW-2
NBH06023K	SS0404F	SS0406F	SS0406F	LW-2
NBH08023K	SS0404F	SS0406F	SS0406F	LW-2
NBH10023K	SS0404F	SS0404F	SS0404F	LW-2
NBH12023K	SS0404F	SS0404F	SS0404F	LW-2
NBH02025K-MET	SS0404F	SS0406F	–	LW-2
NBH02525K-MET	SS0404F	SS0406F	–	LW-2
NBH03025K-MET	SS0404F	SS0406F	SS0408F	LW-2
NBH03525K-MET	SS0404F	SS0406F	SS0408F	LW-2
NBH04025K-MET	SS0404F	SS0408F	SS0408F	LW-2
NBH04525K-MET	SS0404F	SS0408F	SS0408F	LW-2
NBH05025K-MET	SS0404F	SS0408F	SS0408F	LW-2
NBH06025K-MET	SS0404F	SS0408F	SS0408F	LW-2
NBH07025K-MET	SS0404F	SS0408F	SS0408F	LW-2
NBH08025K-MET	SS0404F	SS0406F	SS0406F	LW-2
NBH10025K-MET	SS0404F	SS0406F	SS0406F	LW-2
NBH12025K-MET	SS0404F	SS0404F	SS0404F	LW-2
NBH02025K	SS0404F	SS0406F	–	LW-2
NBH02525K	SS0404F	SS0406F	–	LW-2
NBH03025K	SS0404F	SS0406F	SS0408F	LW-2
NBH03525K	SS0404F	SS0406F	SS0408F	LW-2
NBH04025K	SS0404F	SS0408F	SS0408F	LW-2
NBH04525K	SS0404F	SS0408F	SS0408F	LW-2
NBH05025K	SS0404F	SS0408F	SS0408F	LW-2
NBH06025K	SS0404F	SS0408F	SS0408F	LW-2
NBH07025K	SS0404F	SS0408F	SS0408F	LW-2
NBH08025K	SS0404F	SS0406F	SS0406F	LW-2
NBH10025K	SS0404F	SS0406F	SS0406F	LW-2
NBH12025K	SS0404F	SS0404F	SS0404F	LW-2
NBH04532K	SS0404F	SS0408F	SS0408F	LW-2
NBH05032K	SS0404F	SS0408F	SS0408F	LW-2
NBH06032K	SS0404F	SS0408F	SS0408F	LW-2
NBH07032K	SS0404F	SS0408F	SS0408F	LW-2
NBH08032K	SS0404F	SS0408F	SS0408F	LW-2
NBH10032K	SS0404F	SS0408F	SS0408F	LW-2
NBH12032K	SS0404F	SS0406F	SS0406F	LW-2
NBH14032K	SS0504	SS0506	SS0506	LW-2
NBH16032K	SS0504	SS0506	SS0506	LW-2

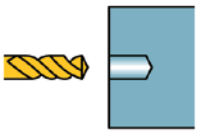
Machining Procedure

① Center drilling



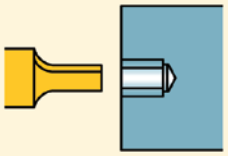
Make a center hole which is smaller than pilot hole drill.

② Drilling (Pilot hole)



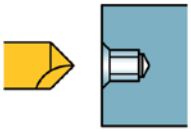
Select a drill with same or smaller (0～-0.1mm) dia. as AF and machine a bit deeper because burrs may cause chipping on shaper insert

③ Shaper tool



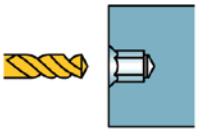
Machine socket rotating 60 degrees 6 times

④ Chamfering



Chamfer with the same pilot hole drill as ①

⑤ Deburring



Finish and deburr with the same drill as in process②
☆Reduce cutting conditions due to heavy interruption

SHAPER DUO Process Chart -Hexalobular-

Socket Size	Tool	Pilot bore Dia. (mm)	Starting" X" position (mm)	Final" X" position (mm)	Number of passes		Estimated cycle time*		
					Roughing pass 0.025mm	Finishing pass 0.005mm	ISO10664 Standard depth of Hexalobular hole (mm)	Whole process ①-⑤	Shaper process ③
T6	**SSP050N25T06**	1.15	1.14	1.75	13	1	1.82	51 sec	23.2 sec
T7	**SSP050N31T07**	1.38	1.35	2.06	15	1	2.44	59 sec	28.2 sec
T8	**SSP050N36T08**	1.62	1.59	2.40	17	1	3.05	67 sec	33.8 sec
T10	**SSP050N41T10**	1.92	1.89	2.80	19	1	3.56	75 sec	39.5 sec
T15	**SSP050N43T15**	2.3	2.29	3.35	22	1	3.81	84 sec	46.2 sec
T20	**SSP050N46T20**	2.71	2.69	3.95	26	1	4.07	94 sec	55.4 sec
T25	**SSP050N50T25**	3.13	3.09	4.50	29	1	4.45	105 sec	63.8 sec
T27	**SSP05S0N55T27**	3.52	3.51	5.07	32	1	4.70	115 sec	71.8 sec
T30	**SSP050N55T30**	3.91	3.89	5.60	35	1	4.95	125 sec	80.2 sec

*Using carbide drills *Shaper cutting conditions Feed: 3000mm/min Depth of cut : Roughing 0.025mm / Finishing 0.005mm

SHAPER DUO Process Chart -Hexagonal-

HEX Standard	Tool	Pilot bore Dia. (mm)	Starting" X" position (mm)	Final" X" position (mm)	Number of passes		Estimated cycle time*		
					Roughing pass 0.025mm	Finishing pass 0.005mm	ISO 2936 standard depth of Hex hole (mm)	Whole process ①-⑤	Shaper process ③
HEX 1.5	**SSP020N1130H**	1.5	1.47	1.73	6	1	2	39 sec	14 sec
HEX 2.0	**SSP020N1430H**	2.0	1.95	2.31	8	1	2.5	44 sec	16 sec
HEX 2.5	**SSP030N1940H**	2.5	2.48	2.89	9	1	3	50 sec	20 sec
HEX 3.0	**SSP030N1940H**	3.0	2.95	3.46	11	1	3.5	55 sec	23 sec
HEX 4.0	**SSP040N2450H**	4.0	3.96	4.62	14	1	5	73 sec	33 sec
HEX 5.0	**SSP050N3260H**	5.0	4.96	5.77	17	1	6	90 sec	46 sec
HEX 6.0	**SSP060N42120H**	6.0	5.97	6.93	20	1	8	117 sec	63 sec
HEX 8.0	**SSP080N62160H**	8.0	7.98	9.24	26	1	10	155 sec	92 sec

*Using carbide drills *Shaper cutting conditions Feed: 3000mm/min Depth of cut : Roughing 0.025mm / Finishing 0.005mm

Recommended cutting conditions

Feed : F1000 - F4000 mm/min Depth of Cut : Roughing 0.025mm / Finishing 0.005mm

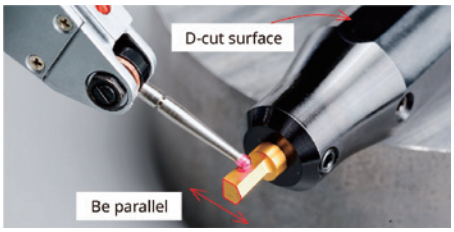
Precautions when replacing the insert bar

The tool nose position dimensions (HF2) vary. Check the dimensions of the cutting tool after changing tools or indexing insert bar.

SHAPER DUO Set-up Instructions -Hexagonal

Outside machine

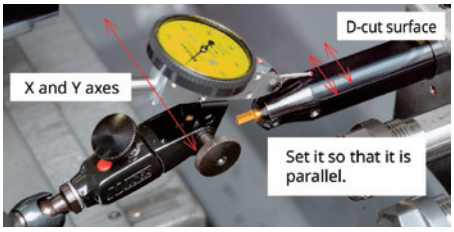
①



- Set the insert bar in the sleeve and check the parallelism of the flat portion of the sleeve and the insert bar.
- Minimize the overhang of the insert.

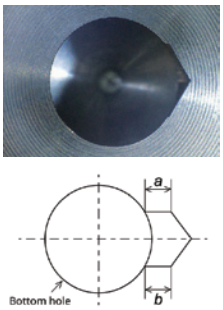
Inside machine

②



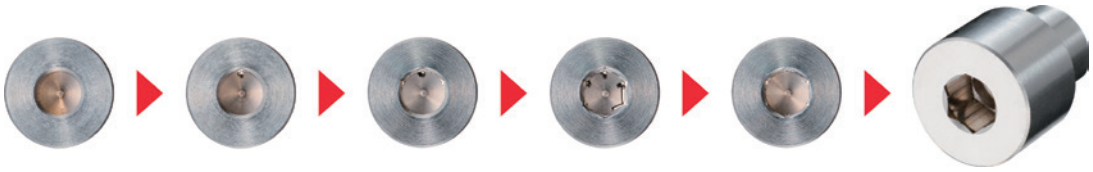
- Set the sleeve into the tool post and make sure the sleeve is set parallel.
- Minimize sleeve overhang.

③

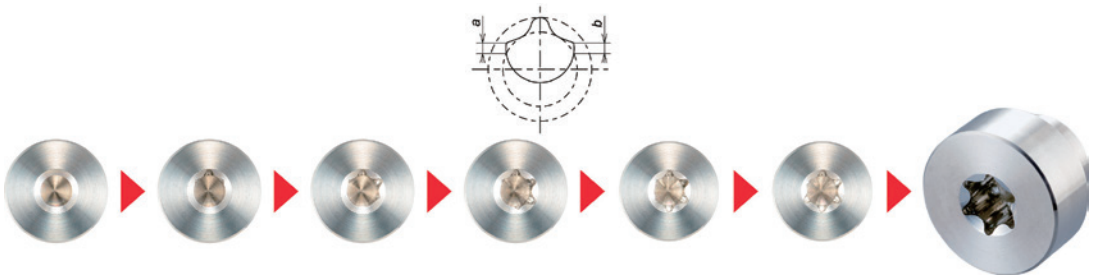


- Increase the number of machining passes with smaller depth of cut if the insert chips with large depth of cut.
  (0.025mm×5pass is recommended)
  No chamfering process is required for measuring purpose.
- Measure the length of both [a] and [b] with comparator or magnifier.
- Adjust centerline height by rotating the sleeve until you get the same length for [a] and [b].(The difference should be less than 0.02mm)
  *If the straight is not seen with increased passes, you need to reset the insert and the sleeve.Please make sure both the insert and the sleeve are set up correctly.

④ **Machine Hexagonal shape**
***Run full HEX machining program.**

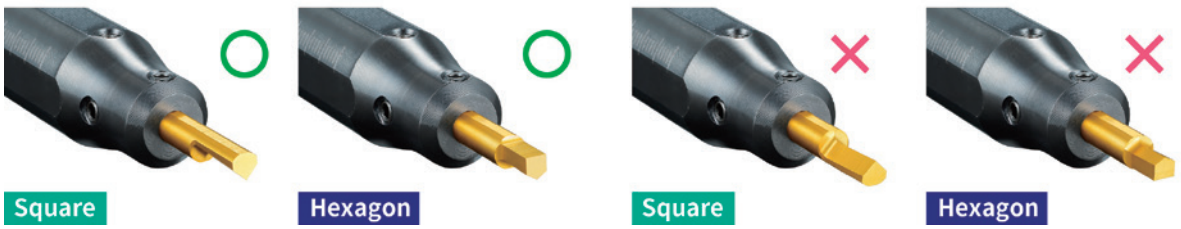


Machining hexalobular shape is basically the same as hexagon socket



Important Note for Insert Set-up

When using the STICK DUO HYPER series, it is important that the insert is installed and oriented so the bar flat is lined up with the clamp screws. If installed in the wrong position, insert edge chipping may occur due to interference with the positioning and clamping screws. See diagram below.



Machining Program Code Explanation

Important: The programming codes and values will depend on the machine brands.For details, please contact the machine manufacturer.
Example machining piece : Hexagon socket dimensions
: AF 3.0mm, Diagonal 3.46mm, Socket depth 3.5mm, Pilot drill diameter ϕ3.0mm
DOC : Roughing 0.025mm / Finishing 0.005mm
Insert bar : TM4 SSP030N1940H

■ Programming tips

- Make a program considering final "X"position.

#1 Final " X "position : 3.46mm (AF)
#2 Finishing position of roughing : 3.46−0.01 (Finishing) =3.45mm
#3 Calculate total DOC for roughing : 3.45−3.0 (Pilot hole) = 0.45mm
#4 Determine number of cuts : 0.45÷0.05 (DOC for Dia.)= 9.0 + 2 (round down to whole number and add " 2" for program adjustment)
→ Roughing sequence runs 11 times
#5 Set starting point : 3.45−(0.05×(11−1)) = 2.95mm : must subtract by "1" for program adjustment

Main program

```
☆:Rear spindle rotation stop
☆:Back spindle indexing  0°  ·····①
T○○○○(Shaper)
G50  U-1.5  ·····②
G0  X2.95  Z-2.0  T○○  ·····③
☆:Sub-program call (○○○①) Repeat 11 times  ·····④
☆:Sub-program call (○○○②)  ·····⑤

☆Back spindle indexing  60°  ·····①
G0  X2.95  Z-2.0
☆:Sub-program call (○○○①) Repeat 11 times  ·····④
☆:Sub-program call (○○○②)  ·····⑤

☆:Back spindle indexing  120°  ·····①
G0  X2.95  Z-2.0
☆:Sub-program call (○○○①) Repeat 11 times  ·····④
☆:Sub-program call (○○○②)  ·····⑤

☆:Back spindle indexing  180°  ·····①
G0  X2.95  Z-2.0
☆:Sub-program call (○○○①) Repeat 11 times  ·····④
☆:Sub-program call (○○○②)  ·····⑤

☆:Back spindle indexing  240°  ·····①
G0  X2.95  Z-2.0
☆:Sub-program call (○○○①) Repeat 11 times  ·····④
☆:Sub-program call (○○○②)  ·····⑤

☆:Back spindle indexing  300°  ·····①
G0  X2.95  Z-2.0
☆:Sub-program call (○○○①) Repeat 11 times  ·····④
☆:Sub-program call (○○○②)  ·····⑤

☆:Spindle indexing release
G0  Z-2.0
G50  U-1.5
G0  U0  W0  T0
M1
```

Sub-program ①

```
N○○○①  (Roughing)
G4  U0.02  ·····⑥
G98  G1  Z3.5  F3000  ·····⑦
G4  U0.02
U-0.2  W-0.018  ·····⑧
G4  U0.02
G0  Z-2.0
G4  U0.02
U0.25  ·····⑨
M99
```

Sub-program ②

```
N○○○②  (Finishing)
G98  G1  X3.46  Z-2.0  F1000
G4  U0.02
Z3.5  F3000
G4  U0.02
U-0.2  W-0.018
G4  U0.02
G0  Z-2.0
M99
```

☆:Enter the program corresponding to your machine.

①=Index the sub-spindle 6 times in 60 degree increments.

②=Specify the coordinate system shift command (in X axis direction) for the tool.
[2 x HF2 ; where HF2 is tool dimension located in the catalog].
* A positive direction shift is recommended for easier programming.

③=Execute the positioning of the tool.
- X position should be smaller than pilot drill diameter.
- Z position should be offset 2.0 mm from material to achieve program feed rate.

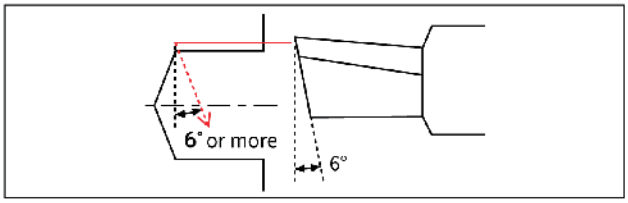
④=Go to the Sub-Program #1.
- Sequence runs 11 times. First cutting point X2.95 and final cutting point X3.45, with 0.05 DOC (for diameter) each time.

⑤=Go to the Sub-Program #2, for finishing sequence.
- Finishing operation with 0.005mm DOC (X 3.46) is recommended for better surface finish.

⑥=Specify dwell time. This allows the program and machine to stay synchronized.

⑦=Cut into part 3.5mm. F3000 is recommended feed to be used for most materials; including Titanium Alloy and Stainless Steel.

⑧=This code backs off the tool with an angle greater than K5 degrees (10 degrees used in example). See page 3.



⑨=Return to the X position + 0.05mm (the DOC for diameter).

Hexagon Socket Programming Code Examples from Machine Builders in Metric

Important: The programming codes and values will depend on the machine brands.For details, please contact to the machine manufactures.
Example machining piece : Hexagon socket dimensions
: AF 3.0mm, Diagonal 3.46mm, Socket depth 3.5mm, Pilot drill diameter ϕ3.0mm
DOC : Roughing 0.025mm / Finishing 0.005mm
Insert bar : TM4 SSP030N1940H

■CITIZEN

Main program

```
M25
M78  S0  ·····①
T○○○○(Shaper)
G50  U-1.5  ·····②
G0  X2.95  Z-2.0  T○○  ·····③
M98  P2100  L11  ·····④
M98  P2200  ·····⑤

M78  S60  ·····①
G0  X2.95  Z-2.0
M98  P2100  L11
M98  P2200
```

《A》

Repeat《A》 at S120, S180, S240, S300 with indexing at 60° increments

```
M20
G0  Z-2.0
G50  U-1.5
G0  U0  W0  T0
M1
```

Sub-program①

```
N2100  (Roughing)
G4  U0.02  ·····⑥
G98  G1  Z3.5  F3000  ·····⑦
G4  U0.02
U-0.2  W-0.018  ·····⑧
G4  U0.02
G0  Z-2.0
G4  U0.02
U0.25  ·····⑨
M99
```

Sub-program②

```
N2200  (Finishing)
G98  G1  X3.46  Z-2.0  F1000
G4  U0.02
Z3.5  F3000
G4  U0.02
U-0.2  W-0.018
G4  U0.02
G0  Z-2.0
M99
```

■STAR

Main program

```
M25
T○○○○ (Shaper)
G50  U-1.5  ·····②
M8
G0  X2.95  Z-2.0  C0  T○○  ·····①③
M98  P2100  L11  ·····④
M98  P2200  ·····⑤

G0  C60.0  ·····①
G0  X2.95  Z-2.0
M98  P2100  L11
M98  P2200
```

《A》

Repeat《A》 at C120, C180, C240, C300 with indexing at 60° increments

```
G0  Z-2.0
G50  U-1.5
G0  T0
G28  W0
M1
```

Sub-program①

```
O2100  (Roughing)
G4  U0.02  ·····⑥
G98  G1  Z3.5  F3000  ·····⑦
G4  U0.02
U-0.2  W-0.018  ·····⑧
G4  U0.02
G0  Z-2.0
G4  U0.02
U0.25  ·····⑨
M99
```

Sub-program②

```
O2200  (Finishing)
G98  G1  X3.46  Z-2.0  F1000
G4  U0.02
Z3.5  F3000
G4  U0.02
U-0.2  W-0.018
G4  U0.02
G0  Z-2.0
M99
```

■TSUGAMI

Main program

```
M105
M150
G28  H0  ·····①
M182
T○○○○  (Shaper)
G50  U-1.5  ·····②
G0  X2.95  Z2.0  T○○  ·····③
M98  P2100  L11  ·····④
M98  P2200  ·····⑤
M183

G0  C60  ·····①
M182
G0  X2.95  Z2.0
M98  P2100  L11
M98  P2200
M183
```

《A》

Repeat《A》 at C120, C180, C240, C300 with indexing at 60° increments

```
M151
G0  Z2.0
G50  U-1.5
G0  U0  W0  T0
M1
```

Sub-program①

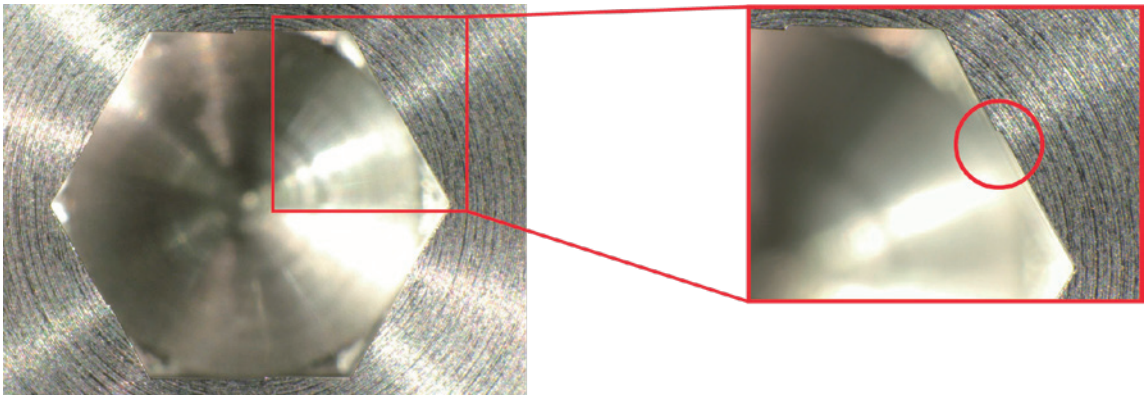
```
O2100  (Roughing)
G4  U0.02  ·····⑥
G98  G1  Z-3.5  F3000  ·····⑦
G4  U0.02
U-0.2  W0.018  ·····⑧
G4  U0.02
G0  Z2.0
G4  U0.02
U0.25  ·····⑨
M99
```

Sub-program②

```
O2200  (Finishing)
G98  G1  X3.46  Z2.0  F1000
G4  U0.02
Z-3.5  F3000
G4  U0.02
U-0.2  W0.018
G4  U0.02
G0  Z2.0
M99
```

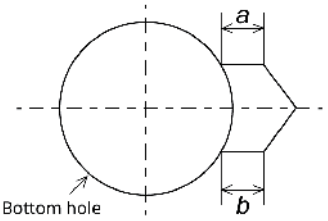
Troubleshooting

Problem: Step on sides

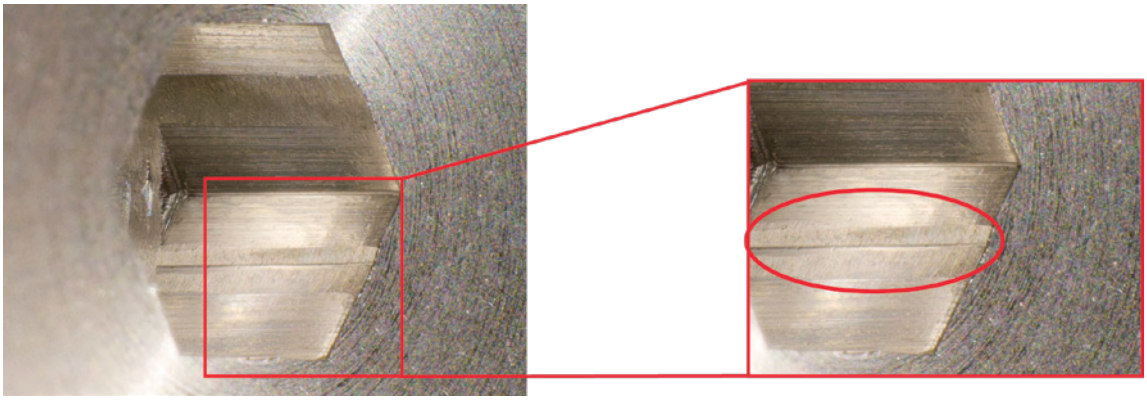


Cause: Incorrect tool set-up (Center-line shift)

Solution: Machine one angle and make sure both [a] and [b] lengths are identical, rotating the sleeve if necessary



Problem: Wall dented



Cause: Pilot hole remaining

Solution: Need pilot hole tool's offset

Problem: Wall tapered

Solution:

- Smaller depth of cut
- Less tool overhang

Problem: Chuck is slipping / Insert chipped

Solution:

- Run at 3000 mm/min feed rate
- Smaller depth of cut

- 3000 mm/min feed rate can cover most materials including Titanium alloy and Stainless steel.
- Too slow or too fast of a feed rate may cause excessive tool pressure for the workpiece and tool.

MEMO

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