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HATHI-LINE

ANTI-VIBRATION BORING BARS

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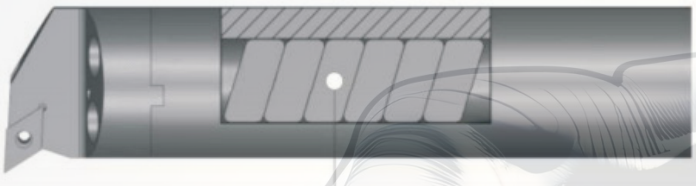
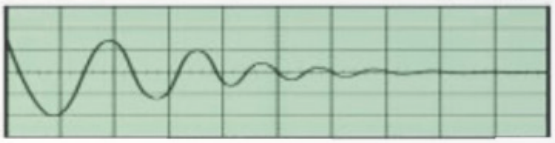
Structure of Dampening System

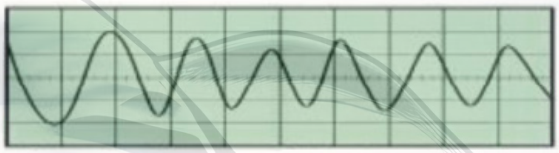


Patented Dampening Material

Comparison of Vibration Amplitude



Monkula Patented Damped Bar (7 x D)

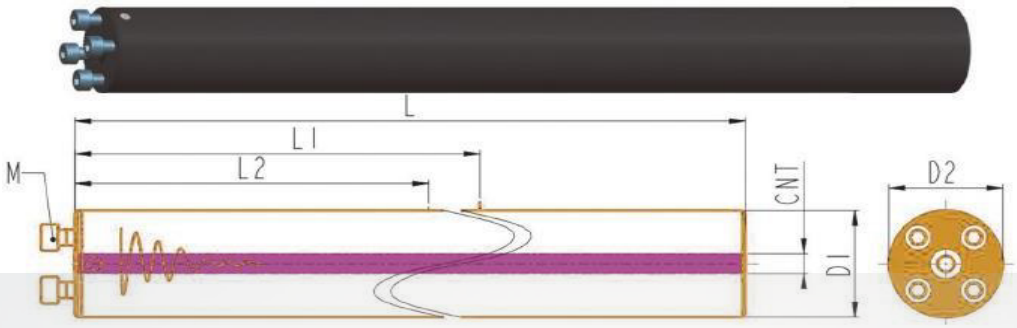


Non Damped Bar (7 x D)

The damping system is mainly composed of damping mass, damping rubber ring and damping fluid. Internal cooling system is optional, and customization is supported.

Features

- Special anti vibration mechanism is adopted to effectively suppress the vibration of the tool.
- To achieve high-speed and efficient deep hole long overhang turning.
- Improve the surface roughness of workpiece and machining dimensional accuracy.
- Extend the cutting life of the tool.
- The blade head can be changed according to the processing method.
- 7D-10D- The machining depth of the whole steel shock absorption shank is 7D-10D of the shank diameter.
- The machining depth of carbide tool bar+ vibration damping structure is 12D-16D of the diameter of the tool bar.

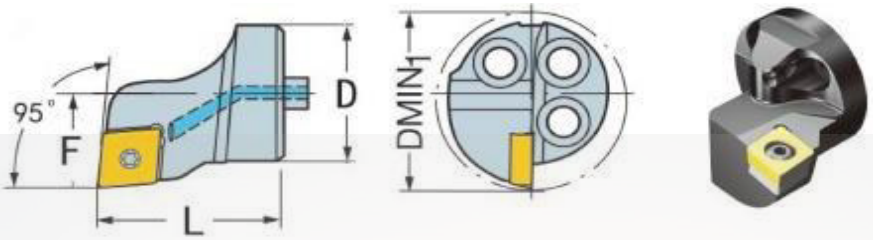


L1: Indicating effective processing length with tool head; L2: Shortest clamping length without head.

Model	Dimensions(mm)					D2	Screw	
	D1	L	L1	L2	L1/D			
E16-7D-156	16	156	112	55	7	16	M3*8	PN1/8-C8
E16-10D-204S	16	204	160	90	10	16	M3*8	PN1/8-C8
E20-7D-200	20	200	140	70	7	20	M3.5*10	PN1/4-C8
E20-10D-260	20	260	200	100	10	20	M3.5*10	PN1/4-C8
E20-12D-320S	20	320	240	160	12	20	M3.5*10	PN1/4-C8
E25-7D-255	25	255	175	88	7	25	M4*10	PN1/4-C8
E25-10D-330	25	330	250	155	10	25	M4*10	PN1/4-C8
E25-12D-380S	25	380	300	200	12	25	M4*10	PN1/4-C8
E25-14D-430S	25	430	350	250	14	25	M4*10	PN1/4-C8
E32-7D-320	32	320	224	100	7	32	M5*12	PN3/8-C8
E32-10D-416	32	416	320	195	10	32	M5*12	PN3/8-C8
E32-12D-480S	32	480	384	256	12	32	M5*12	PN3/8-C8
E32-14D-544S	32	544	448	320	14	32	M5*12	PN3/8-C8
E40-7D-408	40	408	280	128	7	40	M6*12	PN3/8-C10
E40-10D-528	40	528	400	248	10	40	M6*12	PN3/8-C10
E40-12D-608S	40	608	480	320	12	40	M6*12	PN3/8-C10
E40-14D-688S	40	688	560	400	14	40	M6*12	PN3/8-C10
E50-7D-518	50	518	350	168	7	40	M6*12	PN1/2-C10
E50-10D-668	50	668	500	318	10	40	M6*12	PN1/2-C10
E50-12D-768S	50	768	600	400	12	40	M6*12	PN1/2-C10
F50-14D-868S	50	868	700	500	14	40	M6*12	PN1/2-C10
E60-7D-628	60	628	420	208	7	40	M6*12	PN1/2-C10
E60-10D-808	60	808	600	388	10	40	M6*12	PN1/2-C10
E60-12D-920S	60	920	720	480	12	40	M6*12	PN1/2-C10
E60-14D-1040S	60	1040	840	600	14	40	M6*12	PN1/2-C10
E80-7D-880	80	880	560	280	7	40	M6*12	PN1/2-C10
E80-10D-1200	80	1200	800	400	10	40	M6*12	PN1/2-C10
E80-12D-1400	80	1400	960	640	12	40	M6*12	PN1/2-C10
E100-7D-1100	100	1100	700	350	7	40	M6*14	PN3/4-C10
E100-10D-1500	100	1500	1000	550	10	40	M6*14	PN3/4-C10
E120-10D-1900	120	1900	1200	750	10	40	M6*14	PN3/4-C10
E130-10D-2000	130	2000	1300	850	10	40	M6*14	PN3/4-C10
E140-10D-2200	140	2200	1400	900	10	40	M6*14	PN3/4-C10
E150-10D-2400	150	2400	1500	980	10	40	M6*14	PN3/4-C10

The suitable holder head needs to be ordered separately, Support for non-standard customization.

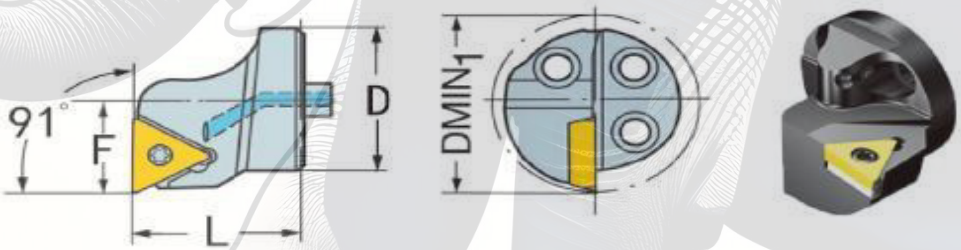
SCLCR



Model	Dimensions(mm)					Insert	Screw	Wrench
	D	Dmin	F		L			
D16-SCLCR/L06	16	20	11	—	20	CC..0602..	M2.5*6	T8
D20-SCLCR/L09	20	24	13	—	20	CC..09T3..	M4*10	T15
D25-SCLCR/L09	25	30	17	—	25	CC..09T3..	M4*10	T15
D32-SCLCR/L09	32	39	22	—	32	CC..09T3..	M4*10	T15
D40-SCLCR/L09	40	48	27	—	38	CC..09T3..	M4*10	T15
D40-SCLCR/L12	40	48	27	—	38	CC..1204..	M5*12	T20

Suitable anti-vibration rod should be ordered separately, Support for non-standard customization.

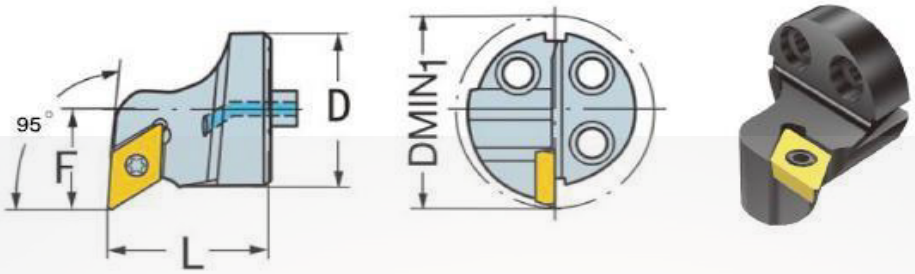
STFCR/STFPR



Model	Dimensions(mm)					Insert	Screw	Wrench
	D	Dmin	F		L			
D16-STFCR/L11	16	20	11	—	20	TC..1102..	M2.5*6	T8
D20-STFCR/L11	20	24	13	—	20	TC..1102..	M2.5*6	T8
D25-STFCR/L11	25	30	17	—	25	TC..1102..	M2.5*6	T8
D32-STFCR/L16	32	39	22	—	32	TC..16T3..	M4*10	T15
D40-STFCR/L16	40	48	27	—	38	TC..16T3..	M4*10	T15
D16-STFPR/L11	16	20	11	—	20	TP..1103..	M3*8	T8
D20-STFPR/L11	20	24	13	—	20	TP..1103..	M3*8	T8
D25-STFPR/L11	25	30	17	—	25	TP..1103..	M3*8	T8

Suitable anti-vibration rod should be ordered separately, Support for non-standard customization.

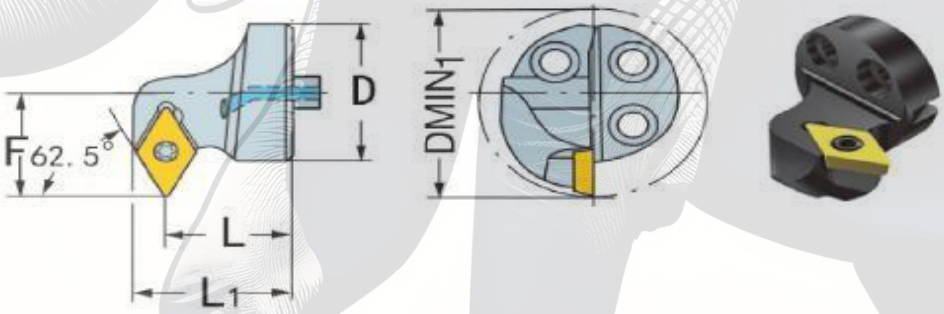
SDUCR



Model	Dimensions(mm)					Insert	Screw	Wrench
	D	Dmin	F		L			
D16-SDUCR/L07	16	20	11	—	20	DC..0702..	M2.5*6	T8
D20-SDUCR/L11	20	24	13	—	20	DC..11T3..	M4*10	T15
D25-SDUCR/L11	25	30	17	—	25	DC..11T3..	M4*10	T15
D32-SDUCR/L11	32	39	22	—	32	DC..11T3..	M4*10	T15
D40-SDUCR/L11	40	48	27	—	38	DC..11T3..	M4*10	T15

Suitable anti-vibration rod should be ordered separately, Support for non-standard customization.

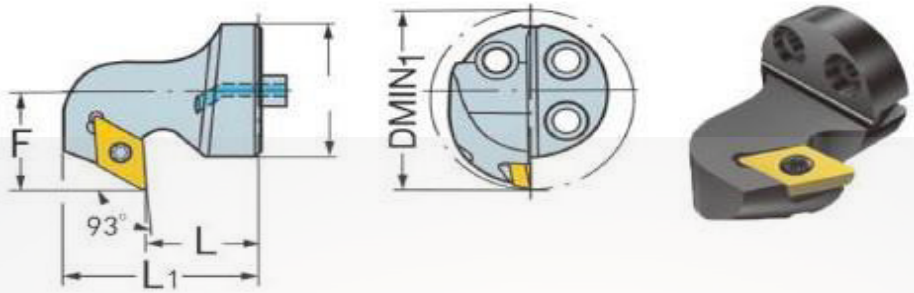
SDWCR



Model	Dimensions(mm)					Insert	Screw	Wrench
	D	Dmin	F	L1	L			
D16-SDWCR/L07	16	20	11	20	15	DC..0702..	M2.5*6	T8
D20-SDWCR/L11	20	24	13	20	15	DC..11T3..	M4*10	T15
D25-SDWCR/L11	25	30	17	25	20	DC..11T3..	M4*10	T15
D32-SDWCR/L11	32	39	22	32	27	DC..11T3..	M4*10	T15
D40-SDWCR/L11	40	48	27	38	33	DC..11T3..	M4*10	T15

Suitable anti-vibration rod should be ordered separately, Support for non-standard customization.

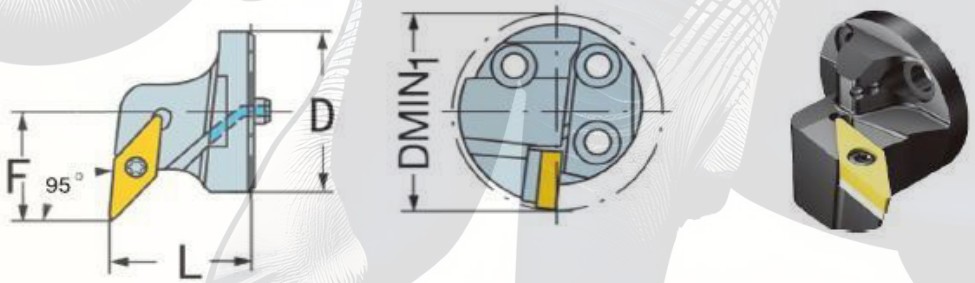
SDZCR



Model	Dimensions(mm)					Insert	Screw	Wrench
	D	Dmin	F	L1	L			
D16-SDZCR/L07	16	20	11	27	15	DC..0702..	M2.5*6	T8
D20-SDZCR/L11	20	24	13	27	15	DC..11T3..	M4*10	T15
D25-SDZCR/L11	25	30	17	27	15	DC..11T3..	M4*10	T15
D32-SDZCR/L11	32	39	22	38	25	DC..11T3..	M4*10	T15
D40-SDZCR/L11	40	48	27	38	25	DC..11T3..	M4*10	T15

Suitable anti-vibration rod should be ordered separately, Support for non-standard customization.

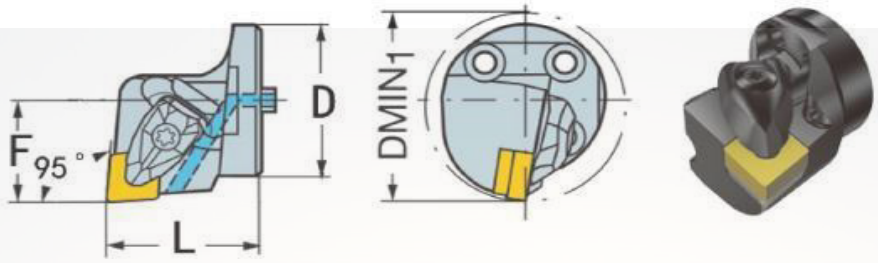
SVUBR



Model	Dimensions(mm)					Insert	Screw	Wrench
	D	Dmin	F		L			
D16-SVUBR/L11	16	20	11		20	VB..1103..	M2.5*6	T8
D20-SVUBR/L11	20	24	13		20	VB..1103..	M2.5*10	T8
D25-SVUBR/L11	25	30	17		25	VB..1103..	M2.5*10	T8
D32-SVUBR/L16	32	39	22		32	VB..1604..	M4*10	T15
D40-SVUBR/L16	40	48	27		35	VB..1604..	M4*10	T15

Suitable anti-vibration rod should be ordered separately, Support for non-standard customization.

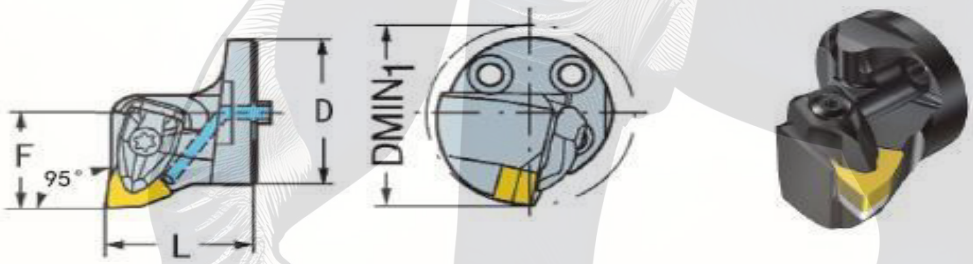
DCLNR/MCLNR



Model	Dimensions(mm)				Insert	Clamp	Screw	Clamp	Screw	Wrench
	D	Dmin	F	L						
D32-DCLNR/L12	32	40	22	38	CNMG1204..	SC1203	CS4*10	D-2	DM5-20	T15
D40-DCLNR/L12	40	50	27	38	CNMG1204..	SC1203	CS4*10	D-2	DM5-20	T15
D40-DCLNR/L16	40	57	32	40	CNMG1604..	SC1603	CS5*12	D-3	DM6-20	T20
D40-MCLNR/L12	40	50	27	38	CNMG1204..	MC1204	CTM617	HL1813	MS625	L3.0
D40-MCLNR/L16	40	57	32	40	CNMG1604..	MC1604	CTM822	HL2217	MS625	L3.L4.

Suitable anti-vibration rod should be ordered separately, Support for non-standard customization

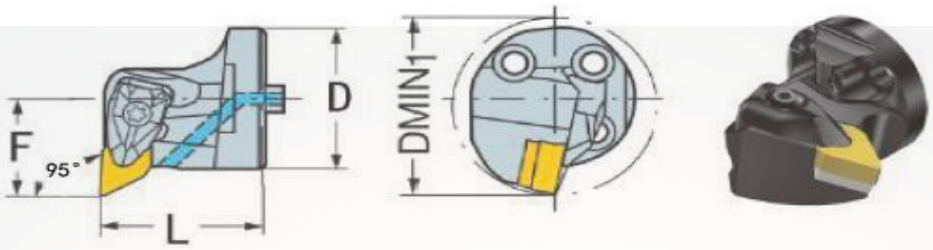
DWLNR/MWLNR



Model	Dimensions(mm)				Insert	Clamp	Screw	Clamp	Screw	Wrench
	D	Dmin	F	L						
D32-DWLNR/L08	32	40	22	36	WNMG0804. .	WC0803	CS4*10	D-2	DM5-20	T15
D40-DWLNR/L08	40	50	26	36	WNMG0804. .	WC0803	CS4*10	D-2	DM5-20	T15
D40-MWLNR/L08	40	50	26	36	WNMG0804. .	MW0804	CTM617	HL1813	MS625	L3.0

Suitable anti-vibration rod should be ordered separate, Support for non-standard customization

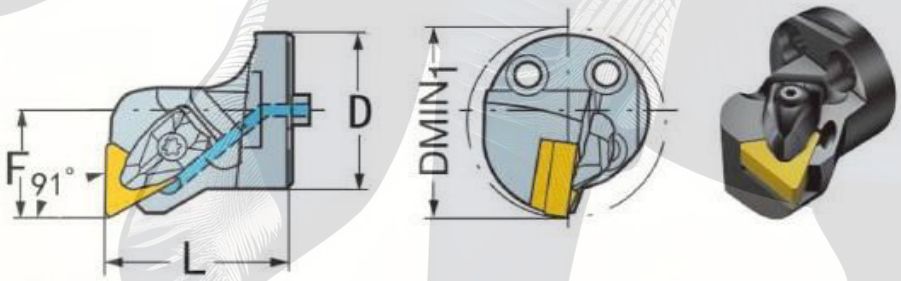
DDUNR/MDUNR



Model	Dimensions(mm)				Insert	Clamp	Screw	Clamp	Screw	Wrench
	D	Dmin	F	L						
D32-DDUNR/L11	32	40	22	35	DNMG1104..	DC1103	CS4*10	D-1	DM4-17	T15
D40-DDUNR/L15	40	50	27	35	DNMG1504..	DC1506	CS4*10	D-2	DM5-20	T15
D40-MDUNR/L15	40	50	27	35	DNMG1504..	MD1506	CTM619	HL2113	MS625	L3.0

anti-vibration rod should be ordered separately, Support for non-standard customization

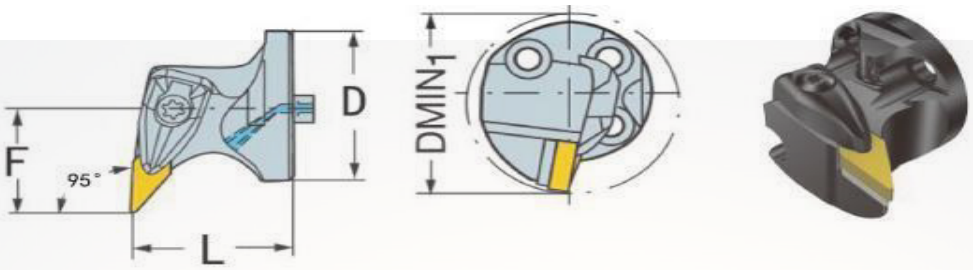
DTFNR/MTFNR



Model	Dimensions(mm)				Insert	Clamp	Screw	Clamp	Screw	Wrench
	D	Dmin	F	L						
D32-DTFNR/L16	32	40	22	36	TNMG1604..	TN1603	CS3.5*8	D-3	DM4-17	T15
D40-DTFNR/L16	40	50	27	36	TNMG1604..	TN1603	CS3.5*8	D-3	DM4-17	T15
D40-MTFNR/L16	40	50	27	36	TNMG1604..	MT1603	CTM513	HL1813	MS625	L2.L3.

Suitable anti-vibration rod should be ordered separately, Support for non-standard customization

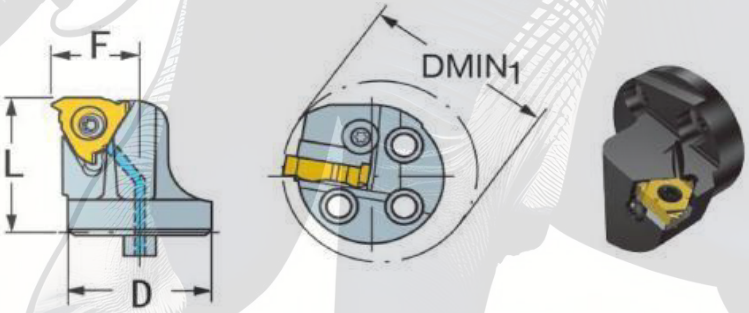
DVUNR/MVUNR16



Model	Dimensions(mm)				Insert	Clamp	Screw	Clamp	Screw	Wrench
	D	Dmin	F	L						
D32-DVUNR/L16	32	40	22	35	VNMG1604..	VN1603	CS4*10	D-3	DM4-17	T15
D40-DVUNR/L16	40	50	27	35	VNMG1604..	VN1603	CS4*10	D-3	DM4-17	T15
D40-MVUNR/L16	40	50	27	35	VNMG1604..	MV1603	CTM513	HL2413	MS625	L2.L3.

Suitable anti-vibration rod should be ordered separately, Support for non-standard customization

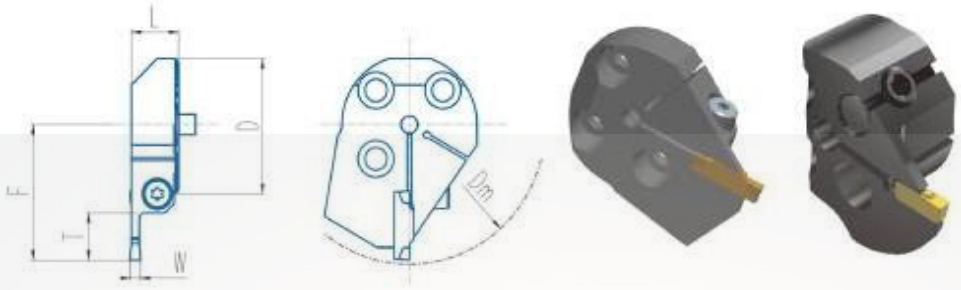
SNR



Model	Dimensions(mm)				Insert	Clamp	Screw		Screw	Wrench
	D	Dmin	F	L						
D16-SNR/L11	16	20	12	20	11NR..	—	M2.5*6	—	—	T8
D20-SNR/L11	20	25	14	20	11NR..	—	M2.5*6	—	—	T8
D25-SNR/L16	25	30	17	25	16NR..	—	M3.5*10	—	—	T15
D32-SNR/L16	32	40	24	32	16NR..	STM16	M3.5*12	—	M3*6N	T15
D32-SNR/L22	32	40	24	36	22NR..	STM22	M4.5*15	—	M4*8N	T20
D40-SNR/L16	40	50	27	36	16NR..	STM16	M3.5*12	—	M3*6N	T15
D40-SNR/L22	40	50	27	36	22NR..	STM22	M4.5*15	—	M4*8N	T20

Suitable anti-vibration rod should be ordered separately, Support for non-standard customization

MGMN



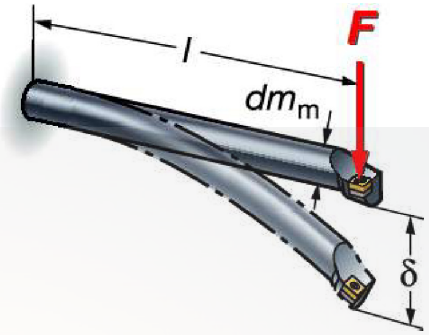
Model	Dimensions(mm)						Insert	Screw	Wrench
	D	Dmin	F	L	T	W			
D25-MGMN200T7	25	37	22	14	7	2	MGMN200	M4*15	L3
D25-MGMN300T12	25	42	28	14	12	3	MGMN300	M4*15	L3
D32-MGMN200T8	32	45	27	14	8	2	MGMN200	M5*18	L4
D32-MGMN300T12	32	49	31	14	12	3	MGMN300	M5*18	L4
D32-MGMN400T12	32	49	31	14	12	4	MGMN400	M5*18	L4
D40-MGMN200T8	40	53	31	14	8	2	MGMN200	M5*18	L4
D40-MGMN300T13	40	58	36	14	13	3	MGMN300	M5*18	L4
D40-MGMN400T13	40	58	36	14	13	4	MGMN400	M5*18	L4

Suitable anti-vibration rod should be ordered separately, Support for non-standard customization.

3. Tool requirements

Internal operations are very sensitive to the ratio between the tool overhang and the diameter. In all cases, the largest diameter and shortest possible overhang should be used.

The importance of minimizing the overhang is illustrated by the figure and the table. The example shows deflection of a solid steel bar at different overhangs at an average cutting force of 1600N.

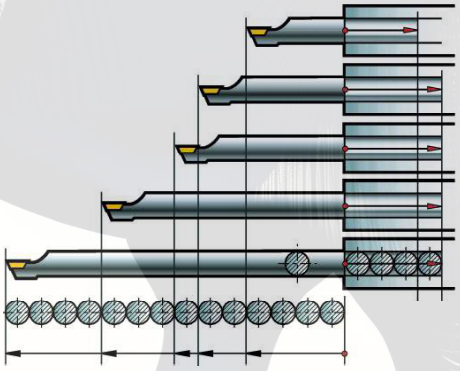


Bar diameter = 32 mm	l = 12 x dm_m	l = 10 x dm_m	l = 4 x dm_m
	384 mm	320 mm	128 mm
Deflection δ, mm	2.7	1.6	1

Boring bar material

As seen in the diagram, the following boring bar materials can be selected to suit the appropriate length to diameter ratio.

Bar type	Overhang	
Steel boring bars:	Up to 4 x dm_m	
Carbide boring bars:	Up to 6 x dm_m	
Steel dampened boring bars, short design:	Up to 7 x dm_m	HATHI-LINE
Steel dampened boring bars, long design:	Up to 10 x dm_m	HATHI-LINE
Carbide reinforced dampened boring bars:	Up to 14 x dm_m	HATHI-LINE



Dampened tools are the best performing tools of their kind. They can provide a smooth surface finish at a close tolerance, even where extremely slender tool assemblies are required.

Tool length and diameter

Increasing the static stiffness of the cutting tool will also make it possible to increase the chip removal rate and productivity, without causing vibration problems.

Choose the boring bar giving the minimum length and the maximum diameter for the hole diameter to be machined. Every opportunity offered by the workpiece to increase the diameter of your tool is important.

Reduction adaptors for smaller cutting heads

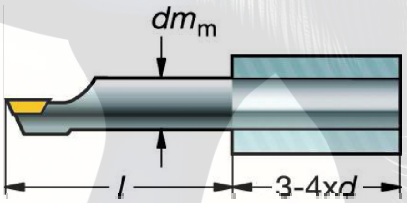
Using a smaller cutting head leads to a lighter front end, which will minimize the kinetic energy in a possible vibration. This will increase the maximum overhang for both solid and dampened tools.

More space is also achieved around the cutting head, which leads to better chip evacuation.

Holding the boring bar

The boring bar deflection is dependent on the bar material, the bar diameter, the overhang, the strength of the radial and tangential cutting forces, and the bar holding in the machine.

Recommended clamping length in a boring bar holder with a sleeve is 3–4 x bar diameter dm_m.

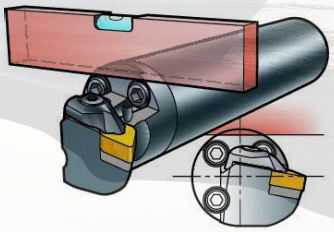


Setting the centre hight

Correct indexing of the centre height is important for the performance of the bar.

- Above 25 mm, check the centre height against a tailstock centre, use a centre height stick or a spirit level.

Spirit level

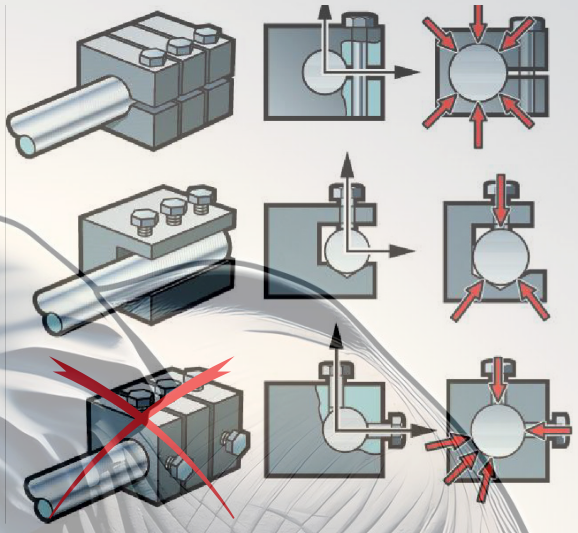


Conventional clamping

For the best performance of the boring bar, the contact – design, dimensional tolerance – between the tool and the tool holder is important.

Solid support is always better then screws acting on the bar, as these may damage the bar. The best stability is obtained from a holder that completely encases the bar.

A V-type bar-holder with screws may be adequate, but a cylindrical holder is not recommended.

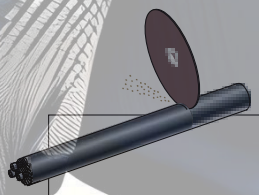


Modification of dampened, Silent Tools, boring bars

The simplest form of a special adaption is the shortening of a standard bar.

Since the Silent Tool bars have a built in tuning arrangement, the length that can be cut off is limited, see table.

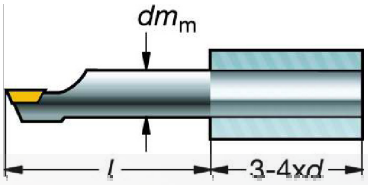
When cutting off a bar to a minimum length, the clamping length must not exceed 3 x bar diameter, dm_m.



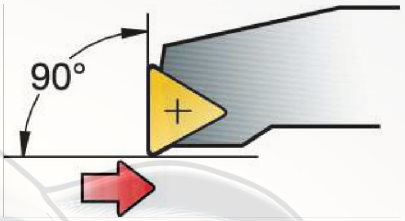
Bar diameter dm_m	Min. length after cut, mm Design **570-3C**	
	Short	Long
16	100	-
20	120	-
25	145	199
32	190	280
40	220	335
50	250	380
60	300	458

Application check list for internal turning

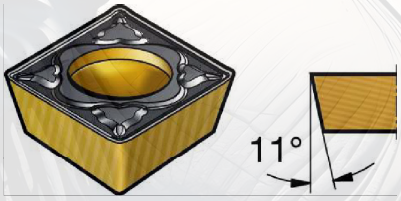
- Choose the largest possible bar diameter, but at the same time ensure that there is enough room for chip evacuation between the bar and the hole.
- Ensure that chip evacuation is sufficient in relation to the cutting data being applied, and the correct type of chips are produced.



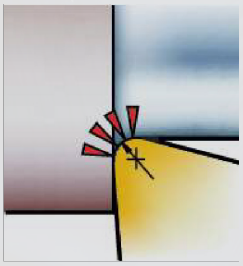
- Choose the smallest possible overhang but, at the same time, ensure that the length of the boring bar allows the recommended clamping lengths. The clamping length should never be smaller than 3 times the diameter of the bar.
- Select an entering angle as close as possible to 90° (it should never be smaller than 75°) so as to direct the cutting forces along the boring bar.



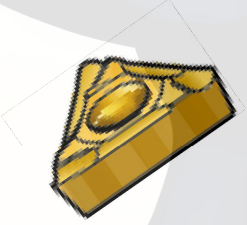
- As a first preference, the indexable insert should have a positive basic-shape and a positive insert geometry to minimize tool deflection.
- Select an insert nose radius which is smaller than the cutting depth.
- Insufficient cutting edge engagement can increase vibrations caused by friction during cutting. Choose a cutting edge for a clean cutting action.

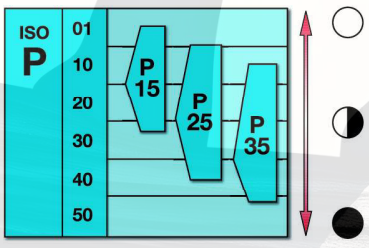


- Excessive cutting edge engagement (large depth of cut and/or feed) can increase vibrations caused by tool deflection.
- Inserts with thin coatings or uncoated inserts normally produce lower cutting forces compared to thickly coated ones. This becomes especially important when the relationship between length/diameter is large. A sharp cutting edge normally improves hole quality by minimizing vibration tendencies.



- A geometry with an open chip breaker (such as R/L-K knife-edge) can often be more advantageous for boring.
- An insert grade with a higher level of toughness may be a consideration in some operations, as it can cope with any risks of chip jamming or vibration tendencies.
- Consider alternative tool paths if chip formation needs to be improved.





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