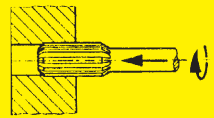


Reamers in general



Reaming and reamers

When demands on hole accuracy are so great that they cannot be met through drilling or core drilling, reaming is used. However, you should note that a reamer follows the hole, which has been prepared in different ways, and that only the accuracy, straightness, roundness and surface finish, but in general not the position of the hole, can be influenced through reaming. Consequently this is a fine finishing method and frequently is characterised as an adjustment operation.

Tolerance and surface finish

The tolerance and surface finish, obtained through reaming, is dependent on many factors such as the tool type and sharpening, the predrilled hole, the using of processing data, lubrication and, if a machine is used, its condition. In general the tolerance IT7 and surface finish $2 \mu\text{m}$ are considered to be the best result you can obtain in production with standard reamers under favourable conditions.

Reamer design

A reamer consists of pilot taper, cutting section with nut, straight or guide bush (slightly tapered towards the shank) as well as the body and shank. A reamer for tapered holes naturally should not have this type of cutting section.

The pilot taper means that you cannot use hand reamers for blind holes. A machine reamer should be used for this.

The diameter of a reamer for an H7-hole of course lie at m5-m6. With other hole tolerances a tolerance is used, according to SMS 580, on the reamer = 35% of the hole's tolerance and so placed that the upper limit should lie at 15% of the hole's tolerance range calculated from the max. limit.

The clearance angle of 6° - 8° is set on both the cutting section and the straight section, but does not back out to the edge on the latter. Instead a straight section of 0.2-0.3 mm is left,

Partly as a guarantee that all blades are equally as high, are partly to reduce the tendency of the reamer to bite. Rake angle is made about 6° positive.

In order to eliminate the tendency to bite and the risk of making unround holes the index is unequal i.e., double indexing.

Both straight and spiral reamers are available. The latter must be used when the hole has a keyway or lubrication slot and probably dominate the market. The spiral direction is usually the opposite to the tool's direction of rotation, partly so that chips are removed in front of the reamer and do not damage the surface and partly so the reamer does not feed itself.

Different types of reamers

Hand reamers

Hand reamers are manufactured with a relatively long cutting section and about 1° pilot taper. They are used for holes with large demands on accuracy, roundness and surface finish. Holes that have been drilled askew from the beginning cannot be straightened. Hand reamers normally have a straight shank with square drive to be turned by hand with the help of a tap wrench.

Machine reamers

Machine reamers on the other hand generally have a relatively short cutting section with about 15° pilot taper. Both straight and tapered shanks are available, the former usually on smaller dimensions. With larger diameters reamers are used with through holes and clamping then takes place using special mandrels.

Fastening in machines usually takes place pivoted, so that the reamer has the possibility of following the predrilled hole through its possible deviation in relation to the machine's feed direction. When a machine reamer is used with fixed fastening it can, in the same way as core drilling, straight the predrilled hole to a certain degree, however significantly less due to the small machining allowance.

Undersize for respective tools with different tool combinations

When processing with	Subsequent processing	Hole \varnothing mm	Under-size	Special instructions
Twist drills	Reaming	-1	0,05	
		> 1-3	0,10-0,15	
		> 3-8	0,15-0,20	
		> 8-15	0,20-0,30	
		> 15-30	0,25-0,40	
	> 30-50	0,35-0,50		
	> 50	-		
	Core drilling once + reaming	-15	1,0-2,0	
		> 15	1,5-2,5	
	Drilling out twice with single edged boring bar + reaming	-25	2,0	
		> 25	3,0	
	Drilling out once with double-edged boring bar + reaming		2,0	
	Core drilling twice - reaming	-15	2,0-3,0	
		> 15	3,0-4,0	
Reamer	Reaming	-10	0,10-0,20	If guide bushes are used the under-size 0.30 mm can be used for all hole dimensions.
		> 10-18	0,15-0,25	
		> 18-30	0,20-0,30	
		> 30-50	0,30-0,40	
		> 50	0,40-0,50	
	Core drilling + reaming		1,5-2,0	
	Core drilling twice + reaming		4,0	
Single edge boring bar	Reaming	20-30	0,3	With the tool combination twist-drill + boring bar 1 + boring bar 2 before reaming leave an the undersize of 0.1-0.2 mm.
		> 30	0,4	
	Drilling out once with single edge boring bar + reaming		0,5	
	Drilling out twice with single edged boring bar + reaming		2,0	
Double edged boring bar	Reaming		0,3	Guide bush
		Drilling out once with double-edged boring bar + reaming		