

## P.O. BOX 1437 **BRIDGEVIEW**, IL 60455-0437



Boxes with numbers indicate first, second or third choice of punch, and recommended clearance

Boxes without numbers indicate it is possible to use the punch and clearance shown depending on the application.

White blocks are not generally recommended.

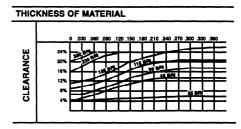
vvnite b	MATERIAL THICKNESS .126–.375																
	SHORT RUNS					LONG RUNS				SHORT Runs				LONG RUNS			
TOTAL CLEARANCE IN PERCENT OF MATERIAL THICKNESS	A-2 STEEL	HIGH SPEED STEEL (HSS)	HSS STRAIGHT GROUND® (SG)	HSS (SG) WHIPSLEEVE®	A-2 STEEL	HIGH SPEED STEEL (HSS)	HSS STRAIGHT GROUND® (SG)	HSS (SG) WHIPSLEEVE®	TOTAL CLEARANCE IN PERCENT OF MATERIAL THICKNESS	A-2 STEEL	HIGH SPEED STEEL (HSS)	HSS STRAIGHT GROUND® (SG)	HSS (SG) WHIPSLEEVE®	A-2 STEEL	HIGH SPEED STEEL (HSS)	HSS STRAIGHT GROUND® (SG)	HSS (SG) WHIPSLEEVE®
 .063- .125									.126- .375								
 4-4-1/2									4-1/2-5								
 5-5-1/2		2			3	2			5-1/2-5		2			3	2		
 Var.									Var.								
 5-6									6-7								
 7-10		2				3		2	10-14		2		3		3		2
22									22								
6-7									7-8								
8-11		1		3		2		3	11-18		2		3		3		2
24									24								
7-8									8-9								
11-15		1		3		3		1	15-22		3		2		3		1
24									24								
7									8-9								
11-15		3		2		3		2	15-22		3		2		3		2
24									24								
7-8									8-9								
12-16		1		3		3		1	16-24		3		1		3		1
 25									25								
10-12									12-15								
13-17		3		1		3		1	17-26		3		1		3		1
27									27								
10-12							5 - 3 - 1 2-4 - 1		12-17								
14-18		3		1		3		1	18-27		3		1		3		1
30						L			30			1915					
18-20			القا														
21-24		3	10,500	1		3		1									
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 CHECK CLEAR. ABOVE	.			1				1	CHECK CLEAR. ABOVE	_			1				1
 1-1/2-1		-				1			1_1/0		-				$\vdash$		
 1-1/2-2		3		1	-	3		1	1-1/2		-			-	,		1
 1-1/2-2		٦				٦			2-2-1/2		3				3		
 4-5	+	$\vdash$		$\vdash$	$\vdash$	$\vdash$			<del> </del>	+	┼		-	+-	-		-
 6-7	$\vdash$	1		-	$\vdash$	2		<b>-</b>	5-6	+	1.			$\vdash$	_		<del> </del>
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 									<u> </u>				1	<u> </u>			

This chart can be used for materials not listed by comparing the Brinell hardness or the shearing strength of the material to be punched.

Shearing strength is approximately four fifths of tensile strength.

MINIMUM CLEARANCE Total both sides. The minimum clearances indicated will produce approximately 60% straight walled holes in materials up to 60,000 P.S.I. shearing strength. However, holes with straight walls 80% or more have been successfully pierced, by dropping the clearance to 4 to 5%, and using whipsleeve punches. Minimum clearance means minimum punch life and more punching pressure required.

STANDARD CLEARANCE Total both sides. The standard clearances indicated will produce approximately 40% straight walled holes in materials 50,000 P.S.I. shearing strength. Standard clearance will give average punch life.



To Find Clearance

Example:

Material to be punched - .187 hot rolled steel, standard clearance shown in chart is 15-22% for material thickness of .125 to

By interpolating 17% is correct standard clearance. 17% of .187 = .032

Correct standard clearance .032 total both sides.

MAXIMUM CLEARANCE Total both sides. The maximum clearance indicated will produce approximately 25% straight walled holes in materials up to 100,000 P.S.I. shearing strength. Ejector punches must be used in most cases when the clearance exceeds 15%, and where the strength of the punch will allow. Maximum punch life is achieved and less press tonnage is required.

DIE BUTTONS - Available in A-2 or high speed steel. The same type of steel used for punches, is recommended in most cases when selecting die buttons.

STRAIGHT GRINDING - Available on all high speed punches. Straight grinding minimizes galling and pick-up while assuring easier stripping. Standard on Whipsleeve® punches.

RATIO PIERCING - Whipsleeve® punches are recommended when the material thickness approaches or is greater than the point diameter, or where material hardness exceeds 175 Brinell. For best results the metal sleeve should be guided in the stripper. Maximum clearance is advised for maximum punch life.

TONDRA® - Although not shown in the recommendations above, we strongly suggest that the user add the designation TONDRA® to all high speed punches and DIE BUTTONS and all straight ground high speed punches for longer life. TON-DRA® imparts extreme surface hardness of 72-75 R/c. (.0005 to .001 deep.) standard on all Whipsleeve® punches

SLUG EJECTORS - We also strongly recommend that slug ejectors be used wherever physically possible to insure trouble free production. Slug ejectors guard against slugs being drawn back out of the die. This is more likely to occur when the clearance exceeds 15%, such as when punching hard or thick material. Minimum point diameter is .062. (If you have strength enough and room enough, use a slug ejector.)

## **RATIO PIERCING - SHAVING - HOT PUNCHING**

The chart at left shows specialized punching applications that require special care in selecting the kind of steel and type of punch and die used, as well as the proper clearance. Use maximum clearance whenever possible in ratio piercing. Shaving punches and punches used in ratio piercing should always be quided in the stripper.

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