



STAMPS & DIES

Technical Data Sheet

CMT COLUMBIA
MARKING
TOOLS



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Columbia Marking Tools provides technical expertise on stamp and die applications and designs.

CMT compiled the following information to assist engineers in indentation marking applications.



CMT Philosophy



Our goal at Columbia Marking Tools is to engineer and manufacture high quality industrial stamps and dies with high grade tool steel, precision machining, and double pass engraving to make sure that the tools will last as long as possible.

- Quality materials
- Precision machining
- Double pass engraved
- Superior heat treating

Columbia Marking Tools manufactures all our stamps and dies in United States of America. Our factory in Chesterfield Michigan maintains the highest quality manufacturing standards.



**COMPLETE
ARTICLE**

BEWARE of low-quality substitutions. CMT does not EDM our dies. The EDM process is known to produce lower quality stamps with a reduced tool life.

Character Face Styles

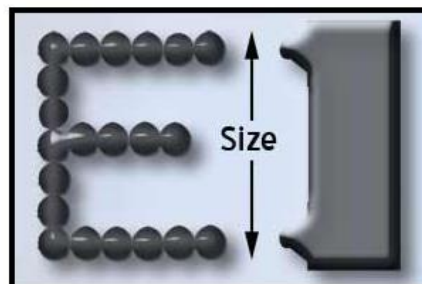
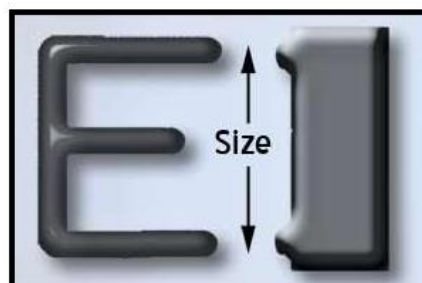
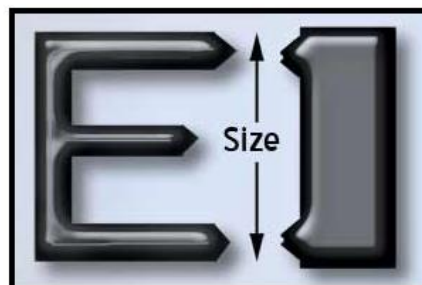
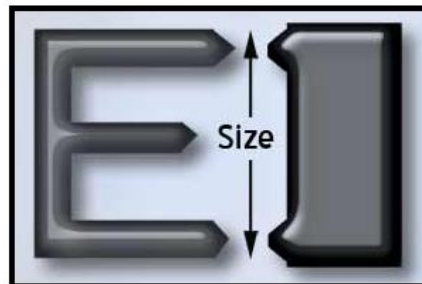
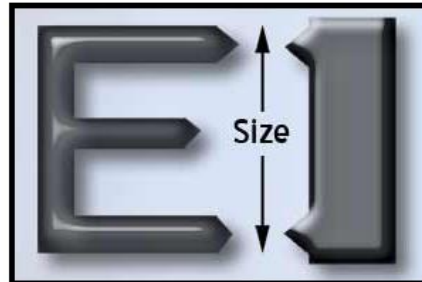
Sharp Face Characters are engraved with a sharp edge. A sharp face tool penetrates more easily than other styles.

Flat Face Characters are engraved with a flat face instead of a sharp edge in order to produce a wider impression. This face is often used on brass or other non-ferrous metals. Since more material is displaced, more force is required.

Open Face Characters have two sharp face lines to produce double line impression of an outline character. This style is used to emphasize trademarks or designs.

Ball Face Characters are engraved with a special rounded face for marking impressions with minimum stress at the point of marking.

Dot Style Characters are engraved with a series of conical dots for the lowest possible stress when marking. Recommended for high pressure fittings, aircraft and other parts where sharp tools might disrupt the molecular structure of the metal.



How to Order Standard Stamps

Build catalog numbers as shown.

- 1) Start with the basic model/stamp style.
- 2) Add the 2-digit character size notation.
- 3) Finish with the reading, alpha-numeri characters, punctuation codes, or Symbol numbers. Some symbols may require a double sized insert.

To order individual **LETTERS** and **FIGURES** add suffix of actual letter or figure to part number

CMG	09	-A
Style	Char Size	Letter or Figure

To order **BLANK SPACERS** add suffix of "-00" to part number

CMF	13	-00
Style	Char Size	Blank Spacer

To order **PUNCTUATION** add suffix from table below to part number

CM8X	25	-RR
Style	Char Size	Asterisk Suffix

2 Digit Character Size

- 1/32" – 03
- 1/16" – 06
- 3/32" – 09
- 1/8 – 13
- 5/32" – 16
- 3/16" – 19
- 1/4" – 25
- 5/16" – 31
- 3/8" – 38
- 1/2" - 50



How to Order Logo Dies and Segments

To order **LOGO DIES** (multiple character stamps) in Flat stamp style add prefix “L” and suffix of **ACTUAL LEGEND** to catalog number.

To order **SEGMENT DIES** (multiple character wedge stamps) in Wedge stamp styles add prefix “S” and suffix of **ACTUAL LEGEND** to catalog number.

L	CMT	09N	-FoMoCo
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Logo Die Style Char Size Stamp reads “FoMoCo”

L	CMT	13	-PAT.PEND.
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Logo Die Style Char Size Stamp reads “PAT.PEND.”

S	CMW	13	-Made In USA
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Segment Die Style Char Size Stamp reads “Made in USA”

Benefits of multi-character dies

1. Characters are exactly lined up.
2. Ability to reduce spacing or marking length.
3. Same wear, all characters mark same depth.
4. Easily add custom logos or characters



Standard Font

Columbia Marking Tools uses a font called "Gothic". This sans serif font is plain and easy to read.

A B C D E F G H I J K L M
N O P Q R S T U V W X Y Z
0 1 2 3 4 5 6 7 8 9

” # / , : . * ~ - > < + % \$ = & x

The alpha/numeric listing above is a reference for the style of font CMT uses. However, there are slight variations between different manufacturing processes.

Even from year to year, the exact font changes slightly. The top part on figure 3, or the top flag on the figure one may be slightly more curved or a different size. CMT strongly recommends providing a picture or rubbing for the exact font recreation when required.



Punctuation

All CMT standard die and stamps are available with a wide variety of punctuation or symbols.

How to order:

For a CM8X 3/8" round insert with a 1/8" character Period - the following code would be used:

CM8X13PP

To order punctuation on a die or stamps use the appropriate code from the following list.

- | | |
|---------------------------|---------------------------------|
| -AA Ampersand (&) | -PP Period (.) |
| -BB Dollar Sign (\$) | -QQ Percent Sign (%) |
| -BS Back Slash (\) | -RR Asterisk (*) |
| -CC Comma (,) | -SS Slash, Diagonal (/) |
| -DD Dash (-) | -TT Number Sign (#) |
| -EE Equals Sign (=) | -US Underscore (_) use JJ |
| -GG Semi Colon (;) | -UU Plus Sign (+) |
| -HH Apostrophe (') | -VV Left Parenthesis [(|
| -II Inch Mark, Quotes (") | -WW Right Parenthesis ()] |
| -JJ Underscore (_) | -YY Exclamation Point (!) |
| -KK Question Mark (?) | -ZZ At Sign (@) |
| -LL Colon (:) | REG- Registration Symbol (®) |
| -MM Multiplication (X) | PEN- Pentastar |
| -NN Number Sign (#) | PUN- Punctuation Other Examples |
| -Degree Symbol (°) | < > ^ ~ [] |

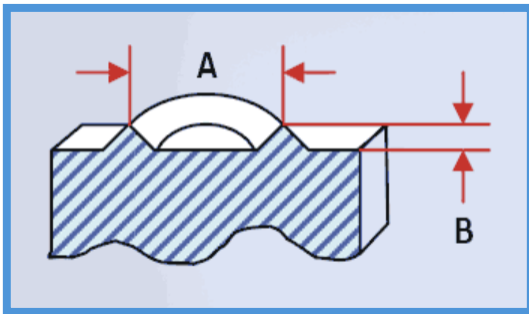
Note:

The Asterisk (RR) is a great choice for easily being read by a camera. The many arms of the character can reliably reflect light in any orientation.

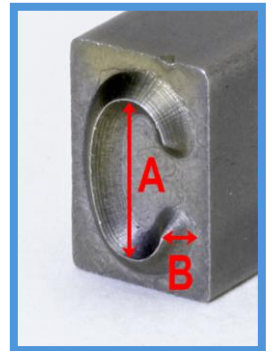


Overestimates of Character Size

Overestimates of the size of the character required are quite common. The three marks above all have the same character size. The overall impression size will vary according to the depth of the mark; this effect must be taken into consideration whenever critical space limitations are a factor.



"A" is the character size. It is measured from point to point. This is hard to do accurately on a worn stamp. A common mistake is to measure the die at the base of the character where it intersects with the back of the stamp.



The three pictures show the issue with estimating the character size from a mark. The three marks are made with the same dies. The only difference is the amount of force used to make the mark. The top picture is made with the least amount of force and looks like a smaller character. The bottom example is made with the most force and looks like larger characters.



Character Size Data

Character Size Chart: For determining height, width, and spacing of characters engraved on steel roll, stamping and embossing dies.

Size	Extra Condensed at 40% Style 1A	Condensed at 50% Style 2A	Standard at 60% Style 3A
1/16" 1.6mm	ABCDEFGGIM1234567890	ABCDEFGGIM1234567890	ABCDEFGGIM1234567890
3/32" 2.4mm	ABCDEFGGIM1234567890	ABCDEFGGIM1234567890	ABCDEFGGIM1234567890
1/8" 3.2mm	ABCDEFGGIM1234567890	ABCDEFGGIM1234567890	ABCDEFGGIM1234567890
3/16" 4.8mm	ABCDEFGGIM1234567890	ABCDEFGGIM1234567890	ABCDEFGGIM123456789
1/4" 6.3mm	ABCDEFGGIM1234567890	ABCDEFGGIM123	ABCDEFGGIM12
5/16" 7.9mm	ABCDEFGGIM123456	ABCDEFGGIM	ABCDEFGGIM
3/8" 9.8mm	ABCDEFGGIM123	ABCDEFGGIM	ABCDEFGGI
1/2" 12.2mm	ABCDEFGGIM	ABCDEFG	ABCDE

This chart is representative of most characters. Some characters are narrower – like the Letter I, and Figure 1. Some characters may be difficult to manufacture in extra condensed – like the Letter M and the Letter W.

Symbols

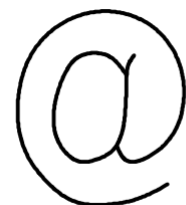
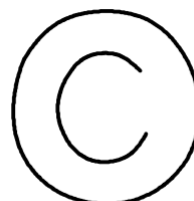
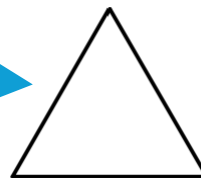
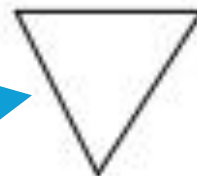
Columbia Marking Tools has 600 standard symbols.

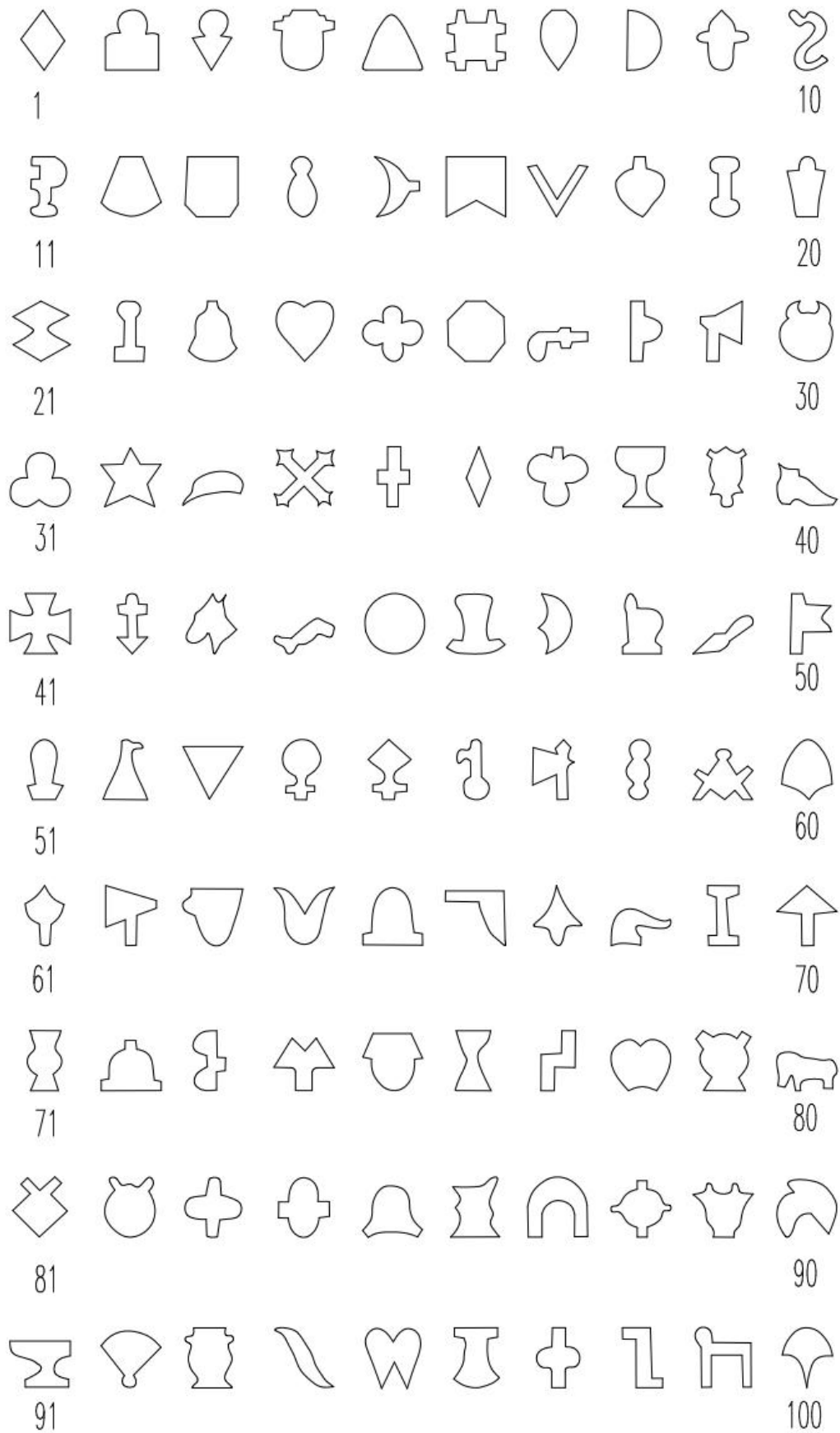
- Some of these symbols may be manufactured with a character inside of them.
- Some of the symbols will require a doublewide blank to be used due to their width.
- The character size of the symbol is measure by the height.
- To order a symbol, add SYM### to the end of the stamp part number. The “###” is the number of the symbol as referenced in the following chart.

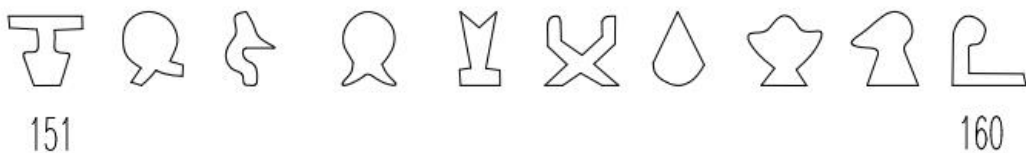
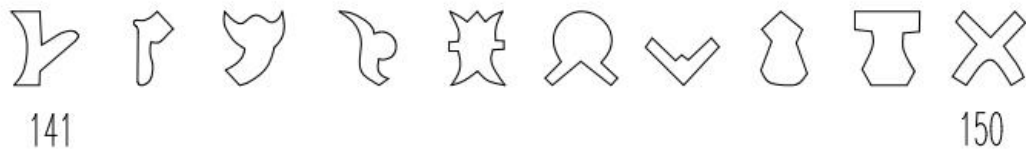
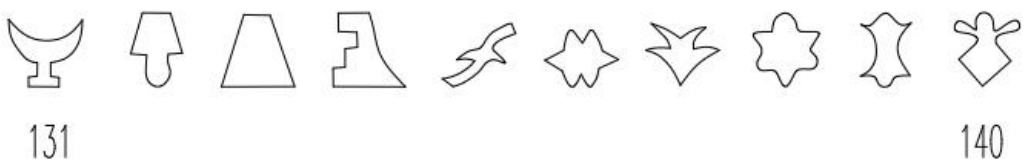
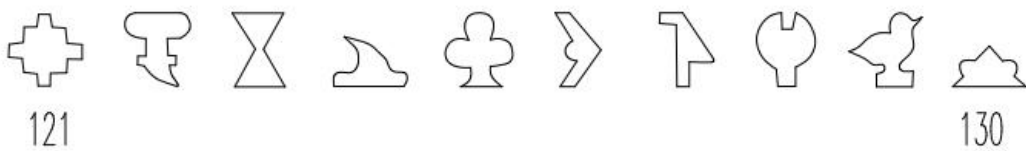
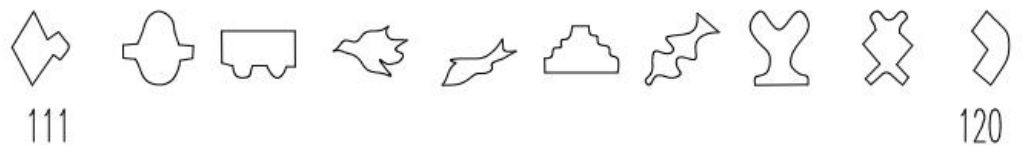
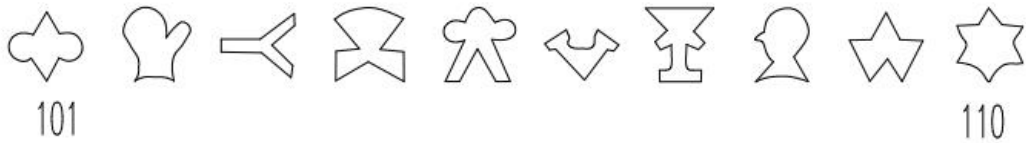


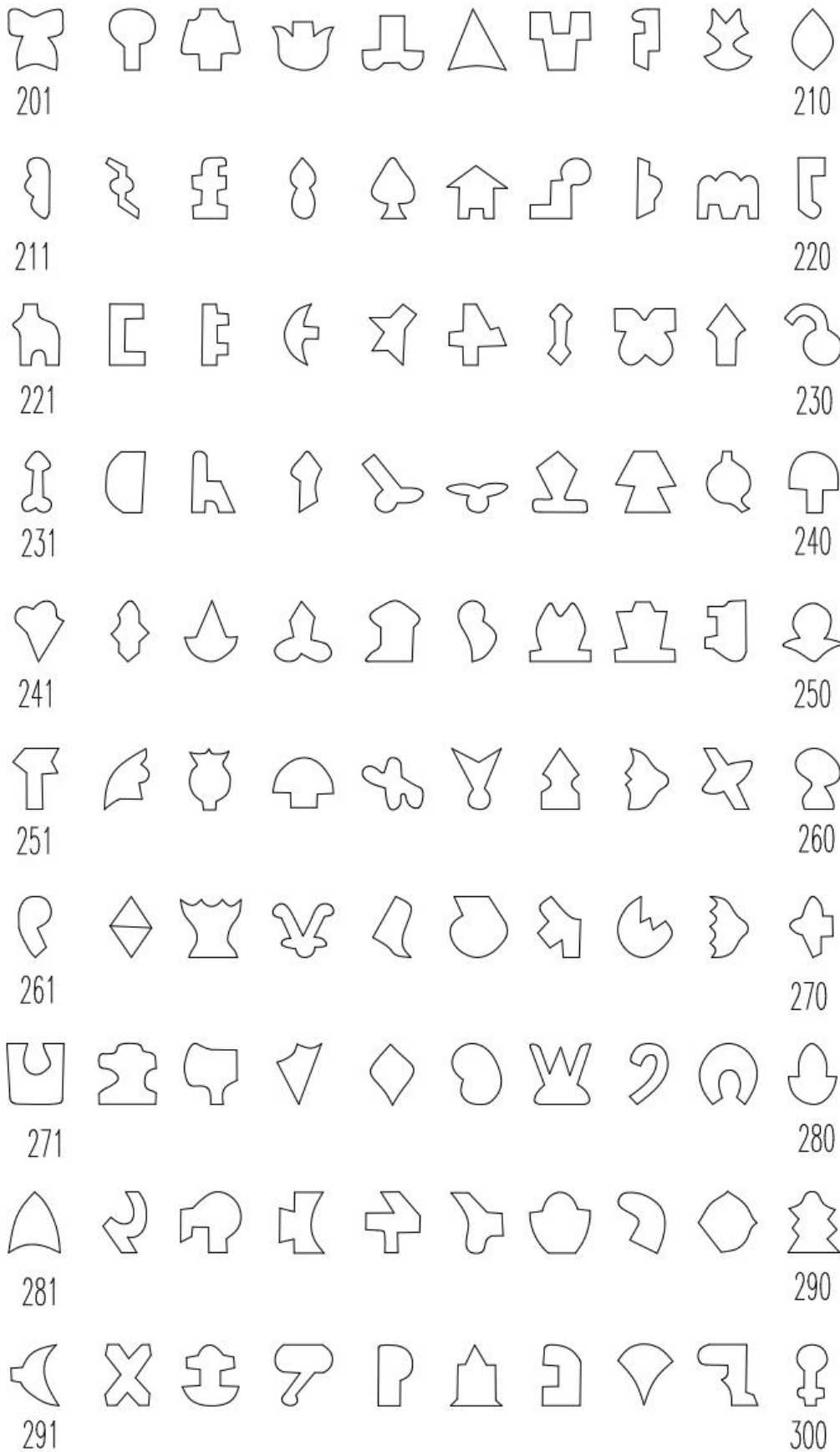
Popular symbols

- Diamond – Symbol #1
- Heart – Symbol #24
- Octagon – Symbol #26
- Delta – Symbol #52
- Trapezoid – Symbol #113
- Split Circle – Symbol #434
- Hexagon – Symbol #591
- Pentagon – Symbol #592
- Square – Symbol #593
- Triangle – Symbol #594
- Oval – Symbol #595
- Arrow – Symbol #596
- Arrow (open head) – Symbol #597
- Copyright – Symbol #598
- Trademark – Symbol #599
- At Sign – Symbol #600











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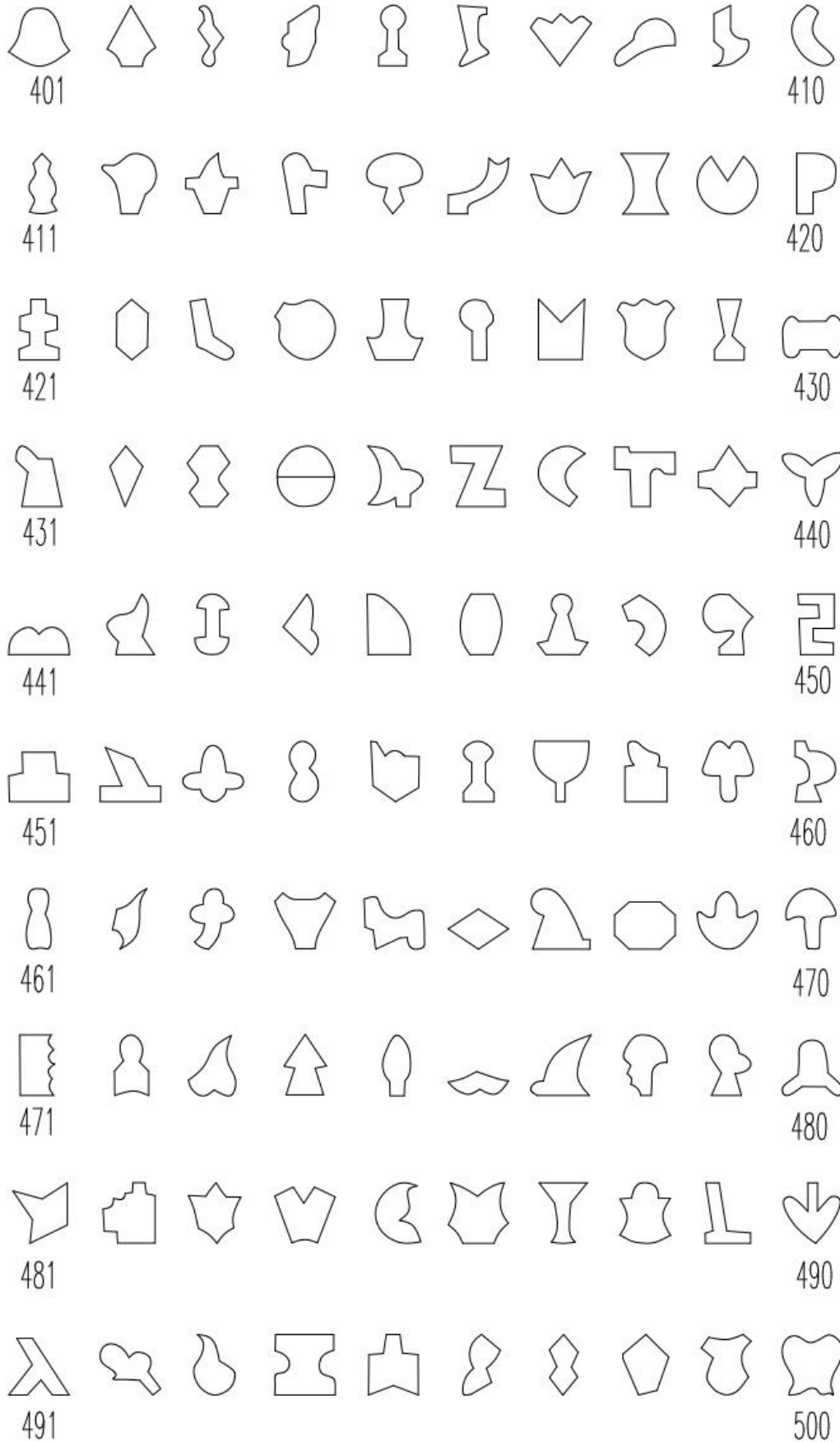
390

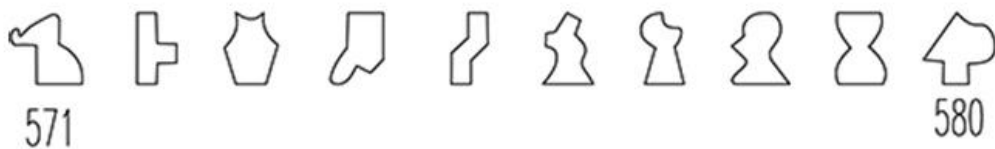
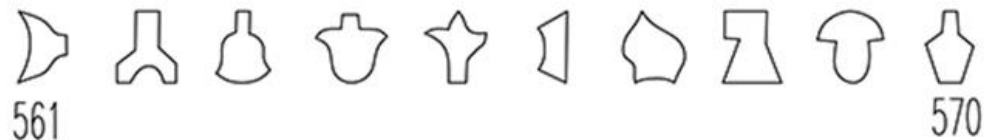
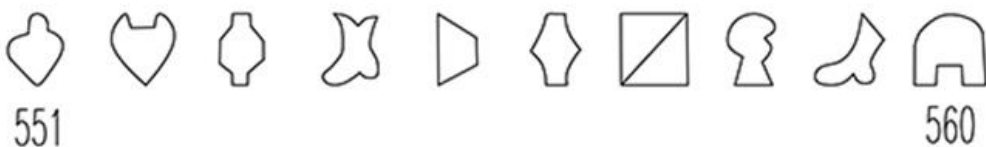
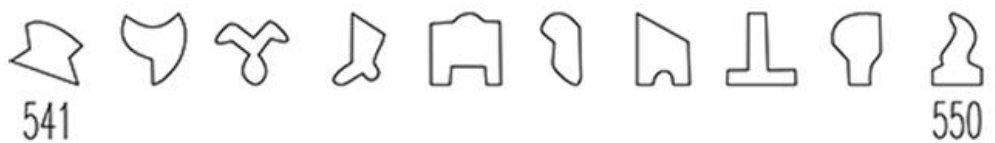
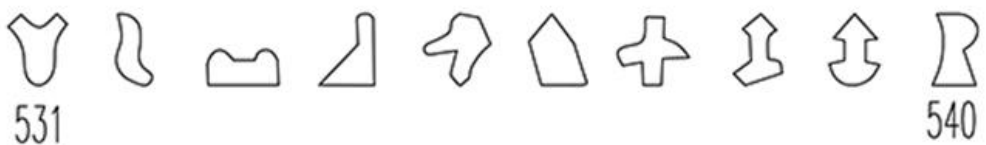


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400





Estimated Hammer Blow Force

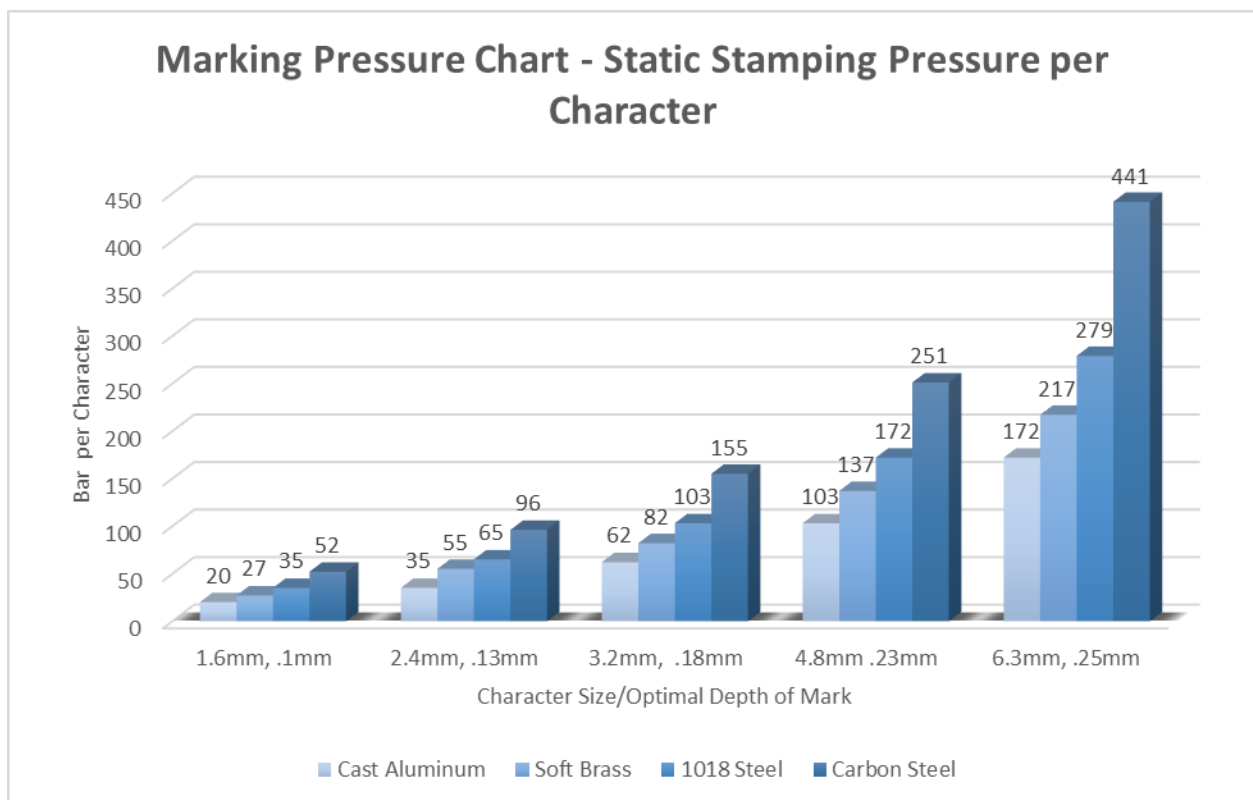
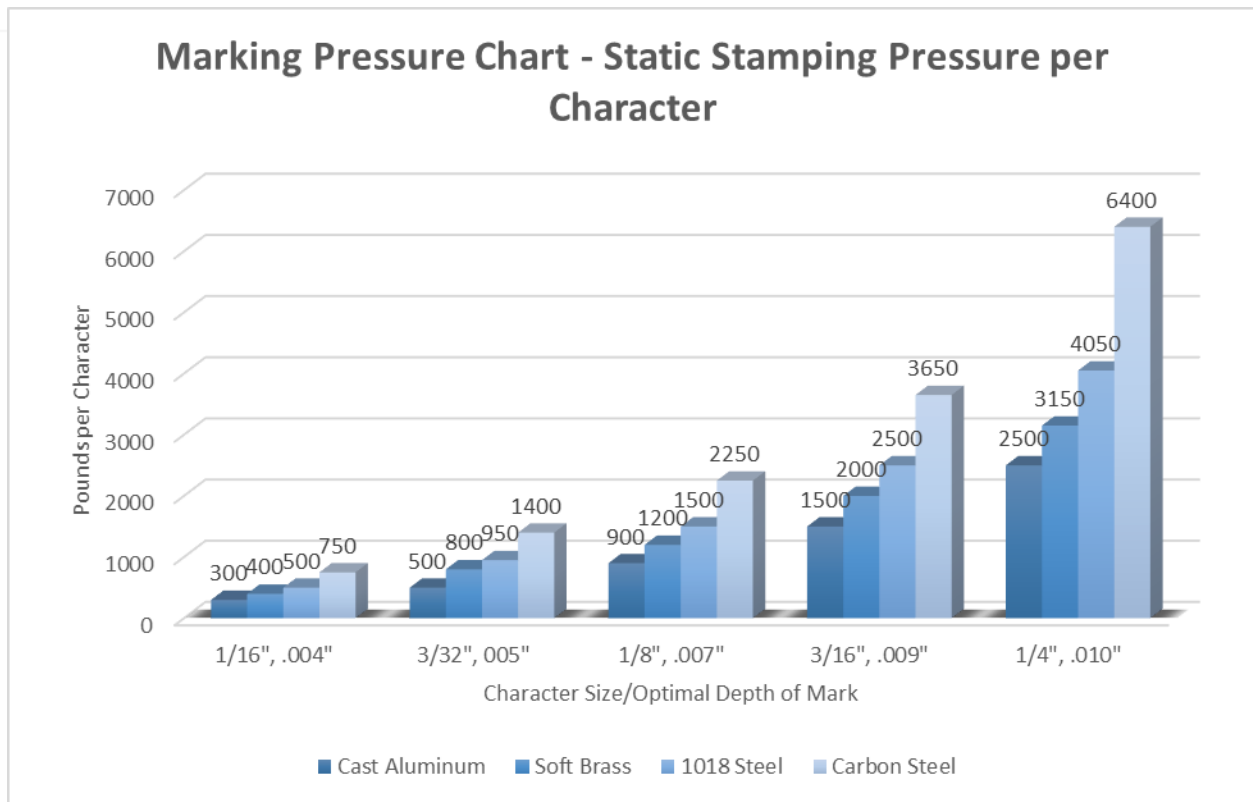
When trying to upgrade from hand stamping to more automated tooling this chart is useful in comparing the hammer blow to the force requirements. The chart may also be used for non-marking applications such as assembly, seating or staking. A simple hammer test can quickly identify the force required and the size of the press needed.

The results of **this** empirical testing are unexpected. The force with a manual hammer can be very high in applied force. The high-pressure results only emphasize the possible safety issues in handheld hammering operations.



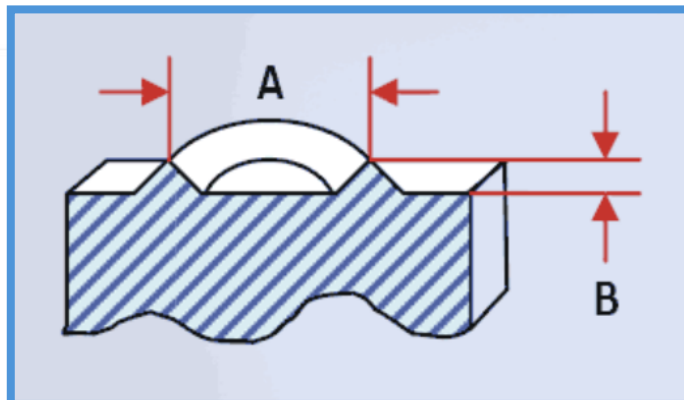
Size of Hammer	Average Machinist	Experienced Machinist	The "Big Guy"
3/4 lbs	3,000 psi	4,000 psi	5,000 psi
.34 Kg	200 bar	275 bar	345 bar
1 lbs	4,400 psi	6,000 psi	7,400 psi
.45 Kg	300 bar	415 bar	510 bar
1 1/2 lbs	6,000 psi	8,000 psi	10,000 psi
.68 Kg	415 bar	550 bar	690 Bar
2 lbs	9,000 psi	12,000 psi	15,000 psi
.9 Kg	620 bar	830 bar	1,025 bar
2 1/2 lbs	12,800 psi	17,000 psi	21,200 psi
1.1 Kg	880 bar	1,172 bar	1,465 bar
3 lbs	22,400 psi	30,000 psi	37,400 psi
1.3 Kg	1,550 bar	2,050 bar	2,580 bar

Marking Pressure Chart



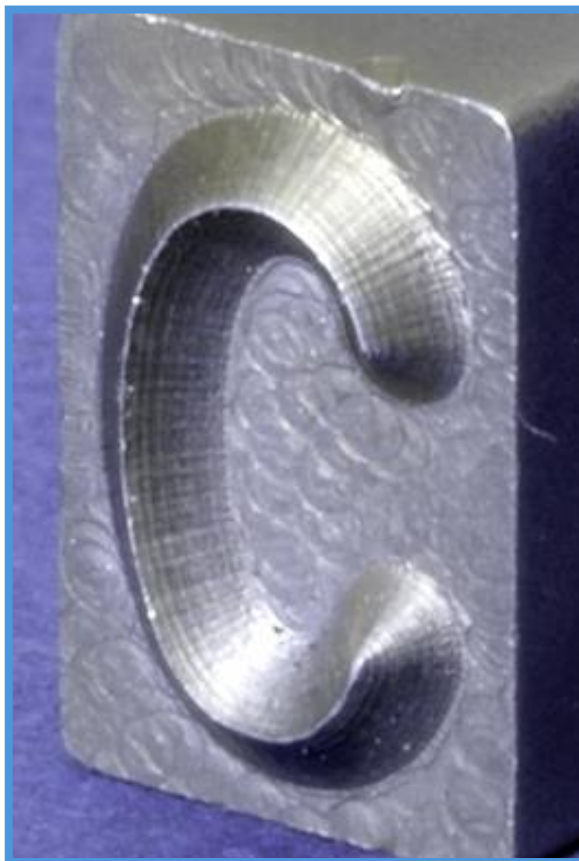
Engraving Depth

The standard engraving depth is provided in the chart shown. The larger the character size the more engraving depth and resulting marking depth can be achieved. **Small characters with too much engraving depth will be “washed out”.**



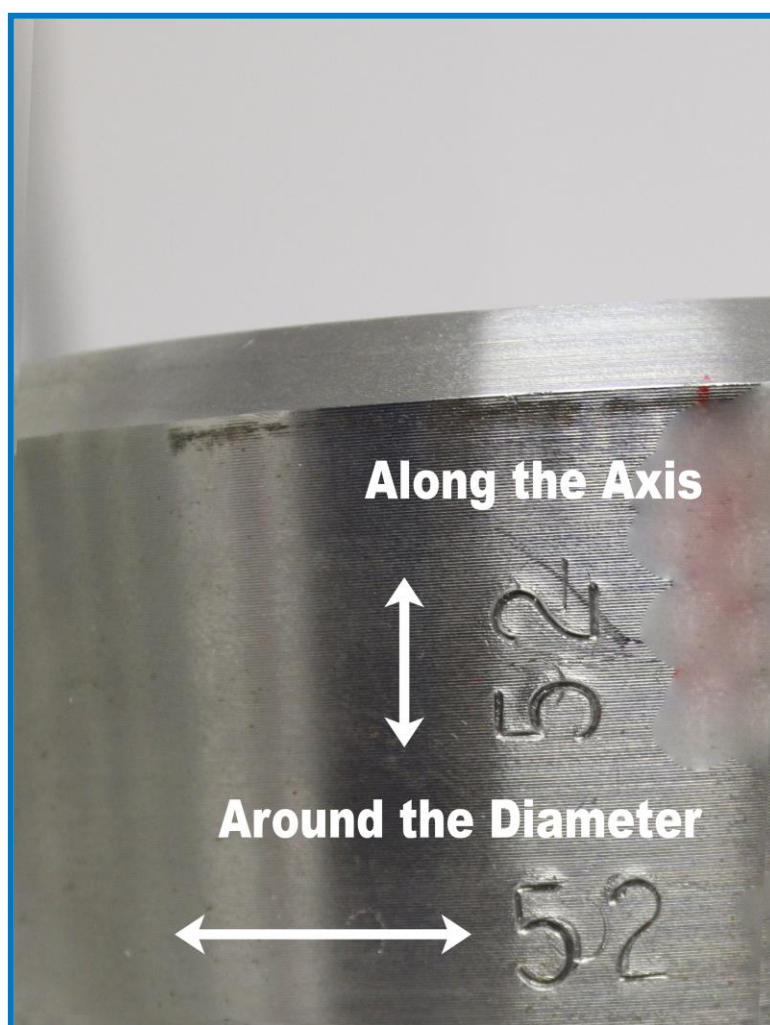
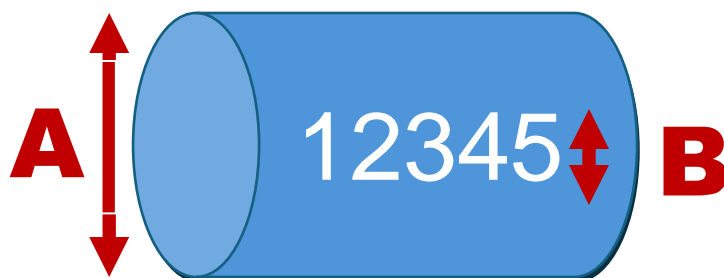
A – Character Size	B – Engraving Depth
1/32", .8mm	.012", .3mm
1/16", 1.6mm	.018", .5mm
3/32", 2.4mm	.020", .5mm
1/8", 3.2mm	.023", .6mm
5/32", 4mm	.025", .6mm
3/16", 4.8mm	.025", .6mm
1/4", 6.3mm	.030", .8mm
5/16", 7.9mm	.032", .8mm
3/8", 9.8mm	.035", .9mm
1/2", 12.7mm	.050", 1.3mm
5/8", 15.9mm	.070", 1.8mm
3/4", 19mm	.078", 2mm
1", 25.4mm	.092", 2.3mm

The standard engraving angle is 45°. The width of the angle is to give the stamping die strength during the indentation marking process. Sometimes for heavy or deep marking operations the engraving angle is increased. The importance of the engraving angle is in the marking legend length. Wider and deeper characters take more room.



Character Size on Rounds

A – Part Diameter	B-Character Size
1/8", 3.2mm	1/64", .4mm
3/16", 4.8mm	1/32", .8mm
1/4", 6.3mm	3/64", 1.2mm
5/16", 7.9mm	1/16", 1.6mm
3/8", 9.8mm	1/16", 1.6mm
7/16", 11 mm	1/16", 1.6mm
1/2", 12.7mm	5/64", 2mm
9/16", 14.3mm	5/64", 2mm
5/8", 15.9mm	3/32", 2.4mm
11/16", 17.5mm	3/32", 2.4mm
3/4", 19mm	3/32", 2.4mm
13/16", 20.6mm	3/32", 2.4mm
7/8", 22.2mm	7/64", 2.8mm
15/16", 23.8mm	7/64", 2.8mm
1", 25.4mm	7/64", 2.8mm
1 1/8", 28.6mm	1/8", 3.2mm
1 1/4", 31.8mm	1/8", 3.2mm
1 3/8", 35.2mm	1/8", 3.2mm
1 1/2", 38.1mm	1/8", 3.2mm
1 5/8", 41.3mm	9/64", 3.6mm
1 3/4", 44.4mm	9/64", 3.6mm
1 7/8", 47.6mm	5/32", 4mm
2" 50.8mm	5/32", 4mm



For very large diameters it is possible to mark around the diameter with a flat holder and type for a limited number of characters.

Style of Fractions

TS – Tier style: Height of standard character. Width of 1 character space, or more for more complex fractions. Greatly reduced character size.

$$\frac{3}{8}$$

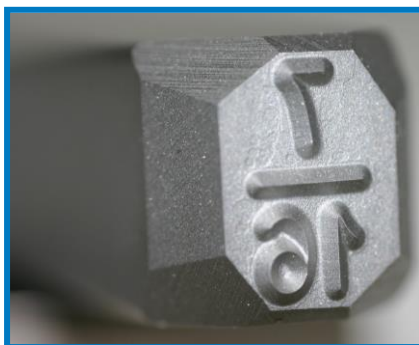
FD – Ful Diagonal: Height of standard character. Slash goes complete height of character. Width of 2-character space, or more for more complex fractions. Greatly reduced character size.

$$\frac{3}{8}$$

SD – Staggered Diagonal: Height of standard character. Slash goes complete height of character. Width of 3-character space, or more for more complex fractions. Slightly reduced character size.

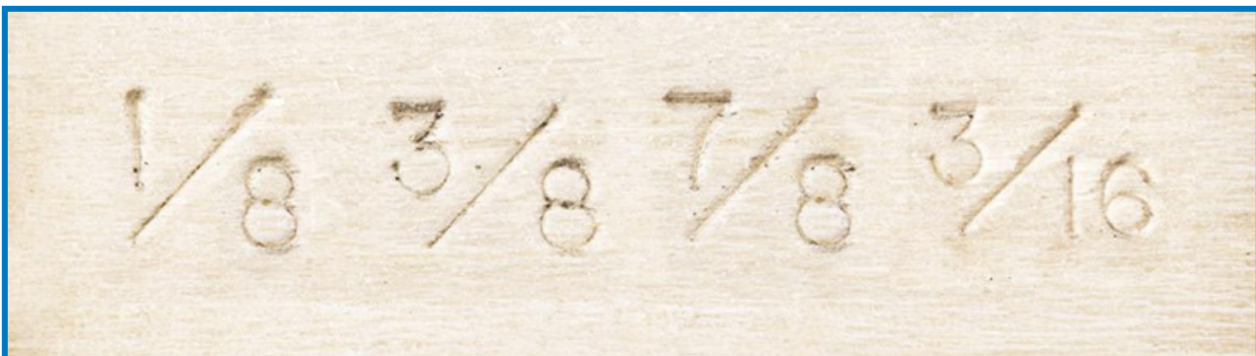
$$\frac{3}{8}$$

SL – Staggered Line Diagonal: Height of standard character. Width of 3-character space, or more for more complex fractions. Same size characters as individual type.

$$\frac{3}{8}$$


Example at left shows a TIER STYLE FRACTION.

Examples below show STAGGERED DIAGONAL FRACTIONS.



Embossing Chart

