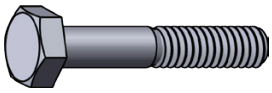
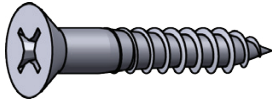


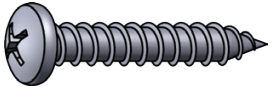
## Common Fastener Types



**Hex bolts**, or *hex cap screws*, are used in machinery and construction. Can be used with a nut, or in a tapped hole. Fully threaded hex bolts are also known as *tap bolts*.



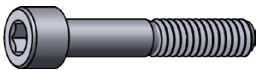
**Wood screws** have large threads and a smooth shank for pulling two pieces of material together. They can be used in wood and other soft materials.



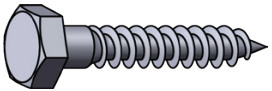
**Sheet metal screws** have sharp points and threads, and are designed to be driven directly into sheet metal. They can also be used in softer materials like plastic, fiberglass, or wood.



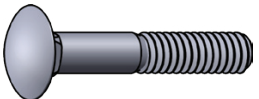
**Machine screws** are fully threaded for use with a nut or in a tapped hole. Certain types are sometimes referred to as *stove bolts*.



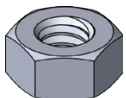
**Socket screws** are machine screws with an internal hex socket (*Allen*) drive. Longer lengths may have a smooth shank.



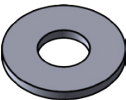
**Lag bolts**, or *lag screws*, are large wood screws with hex heads. Typically used for wood construction and landscaping.



**Carriage bolts** have smooth, domed heads with a square section underneath that pulls into the material to prevent spinning during installation.



**Nuts** are used to fasten machine threaded fasteners in through-hole applications. *Lock nuts* help prevent loosening.



**Washers** spread the load over a greater surface area when tightening a bolt, screw or nut. *Lock washers* help preventing loosening.

*Tip: Find a more comprehensive fastener type chart at <http://boltdepot.com/info>*

## Grade / Class and Fastener Strength

Fastener **Grade** (US) or **Class** (metric) refers to the mechanical properties of the fastener material. Generally, a higher number indicates a stronger, more hardened (but also more brittle) fastener.

*For a chart of fastener grades, head markings and mechanical properties, see Bolt Depot's Grade markings and Strength Chart at <http://boltdepot.com/info>*

### US bolt head markings



Grade 2

Grade 5

Grade 8

### Metric bolt head markings



Class 8.8

Class 10.9

Class 12.9

**Note:** In addition to these markings, the head will often have a manufacturer stamp.

## Fastener Materials

**Note:** Do not rely on this guide for color-matching. The appearance of these materials sometimes differs significantly from the photos below.

**Zinc-plated steel** is a low carbon steel for general use. Relatively inexpensive, with the zinc plating providing moderate corrosion resistance suitable for indoors or otherwise dry conditions. Color is either a blue-ish tint or yellow depending on the exact process.



**Hot-dipped galvanized steel** has a thicker zinc coating for better corrosion resistance, making it suitable for outdoor use. Because of the thick plating, only galvanized nuts and washers will fit galvanized bolts. The coating typically has a rough, dull grey finish.



**Stainless steel** offers good corrosion resistance, making it suitable for outdoor and marine applications, but is more expensive than zinc plated.



**Chrome and nickel plated steel** are smooth and polished for appearance. The plating offers moderate corrosion resistance.



**Brass and bronze** are copper alloys with good corrosion resistance. More expensive than steel, these materials are typically used for decorative applications. Colors can vary significantly.



**Alloy steel** is highly hardened and usually black oxide and/or oil coated, offering little corrosion resistance.



# How Fasteners are Notated: An Example



**Machine screws, Phillips pan head, Stainless steel 18-8, #12-24 x 1"**



## Drive Types

- Phillips
- Frearson
- Pozi driv
- Slotted
- Combo
- Hex socket (Allen)
- Square (Robertson)
- Torx

**Phillips and Slotted** drives are common in screws, but prone to cam-out (stripping).

**Combo** drives, that can be used with either driver, are available for many fastener types.

**Frearson and Pozi driv** are similar to Phillips, but less prone to cam-out.

**Hex socket (Allen)** drives are compact and easy to drive, but prone to cam-out.

**Torx and Square** drive are resistant to cam-out and can be installed single-handed.

**Note:** Most drive types (Frearson and Slotted being notable exceptions) require the correct driver size for proper installation.

## Head Styles



**Hex heads** are typically used with larger bolts and screws, and tightened with a wrench.



**Pan heads** have a slightly domed head that sits above the surface.



**Flat heads** are installed in a countersunk hole for a flat surface.



**Round heads** are tall domed heads, used primarily for decorative purposes.



**Oval heads** are a low domed and countersunk heads, used primarily for decorative purposes.



**Truss heads** are slightly domed, with a wide head for an extra large surface area.



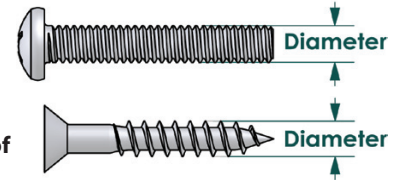
**Socket heads** are narrow with a socket drive, and knurled or smooth sides.



**Button heads** feature a medium dome. Typically used with a hex socket drive.

## Measuring Diameter

For most types of fasteners, the diameter is measured on the **outside of the threads**.



**Note:** US diameters under 1/4" are given as numbers (e.g. #12) instead of inches, in order of increasing size. If you need to find the actual diameter, use a table corresponding to your fastener type at <http://boltdepot.com/info>

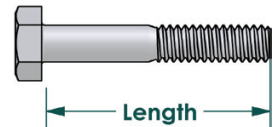
## Thread Count and Thread Pitch

Machine threaded fasteners specify a thread density in **Threads Per Inch (US)** or as a **Thread Pitch** in mm (Metric).

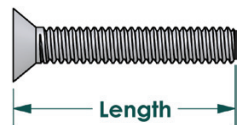
For a given diameter, a fastener may be available in **coarse** (standard), **fine** and sometimes **super fine** thread.

## Measuring Length

Fastener length is usually measured from where the material is assumed to be to the end of the fastener.

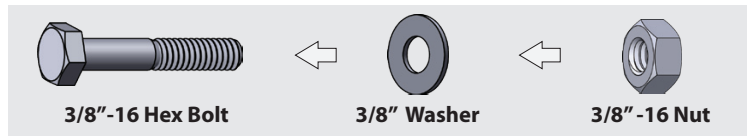


Thus, countersunk fasteners are measured overall and non-countersunk fasteners are measured from under the head.

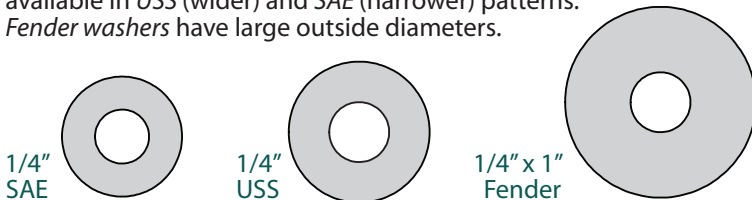


## Nut and Washer Sizes

Nut and washer sizes indicate **the screw or bolt they fit**. For example:



Different washer patterns have different *outside diameters*. For example, hardened US washers are available in **USS** (wider) and **SAE** (narrower) patterns. *Fender washers* have large outside diameters.



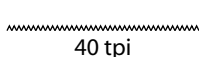
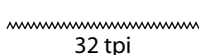
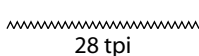
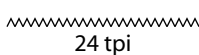
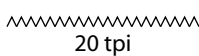
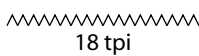
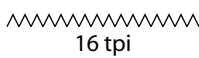
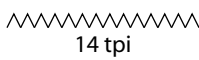
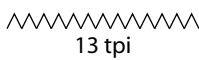
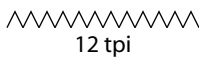
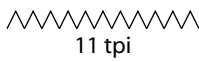
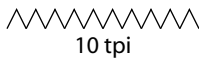
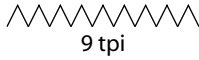
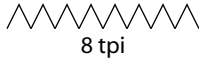
## More Information

At <http://boltdepot.com/info> you'll find:

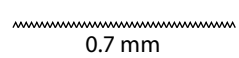
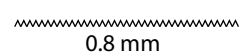
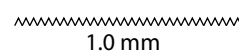
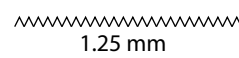
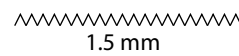
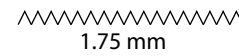
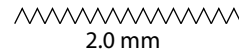
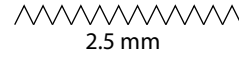
- **In-depth fastener info**
- **Charts and tables**
- Printable **lay-over charts** and **tools** for quickly identifying fastener sizes and types
- Much more...



## US Thread Sizes



## Metric Thread Pitches



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**IMPORTANT:** Make sure to print this chart to **Actual Size** (no scaling).  
After printing, measure the scale check below to ensure correct scale. See [boltdepot.com/tools](http://boltdepot.com/tools) for more details.

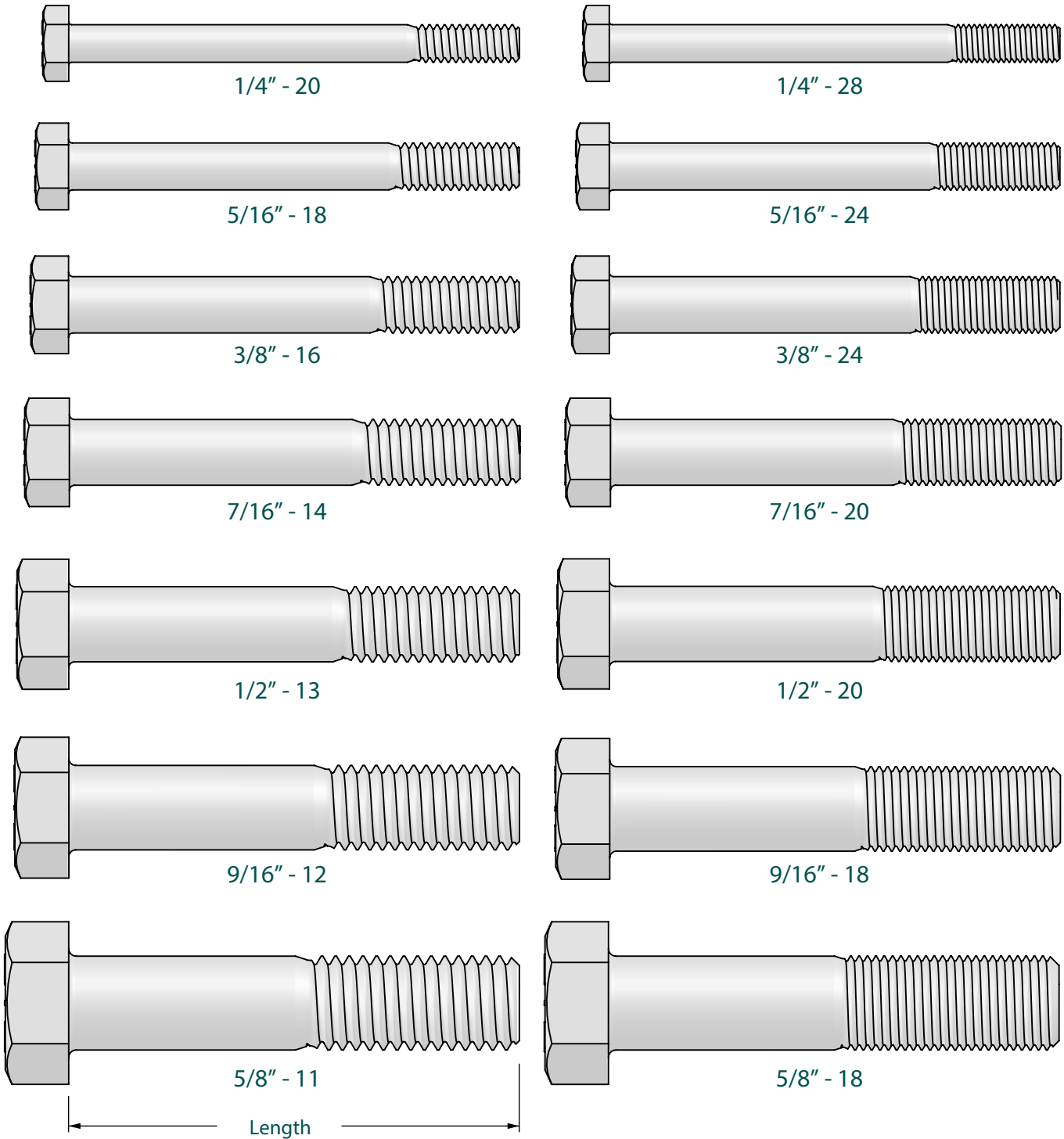


# Standard US Hex Bolt Sizes and Thread Pitches

www.boltdepot.com/tools

## Coarse Thread

## Fine Thread



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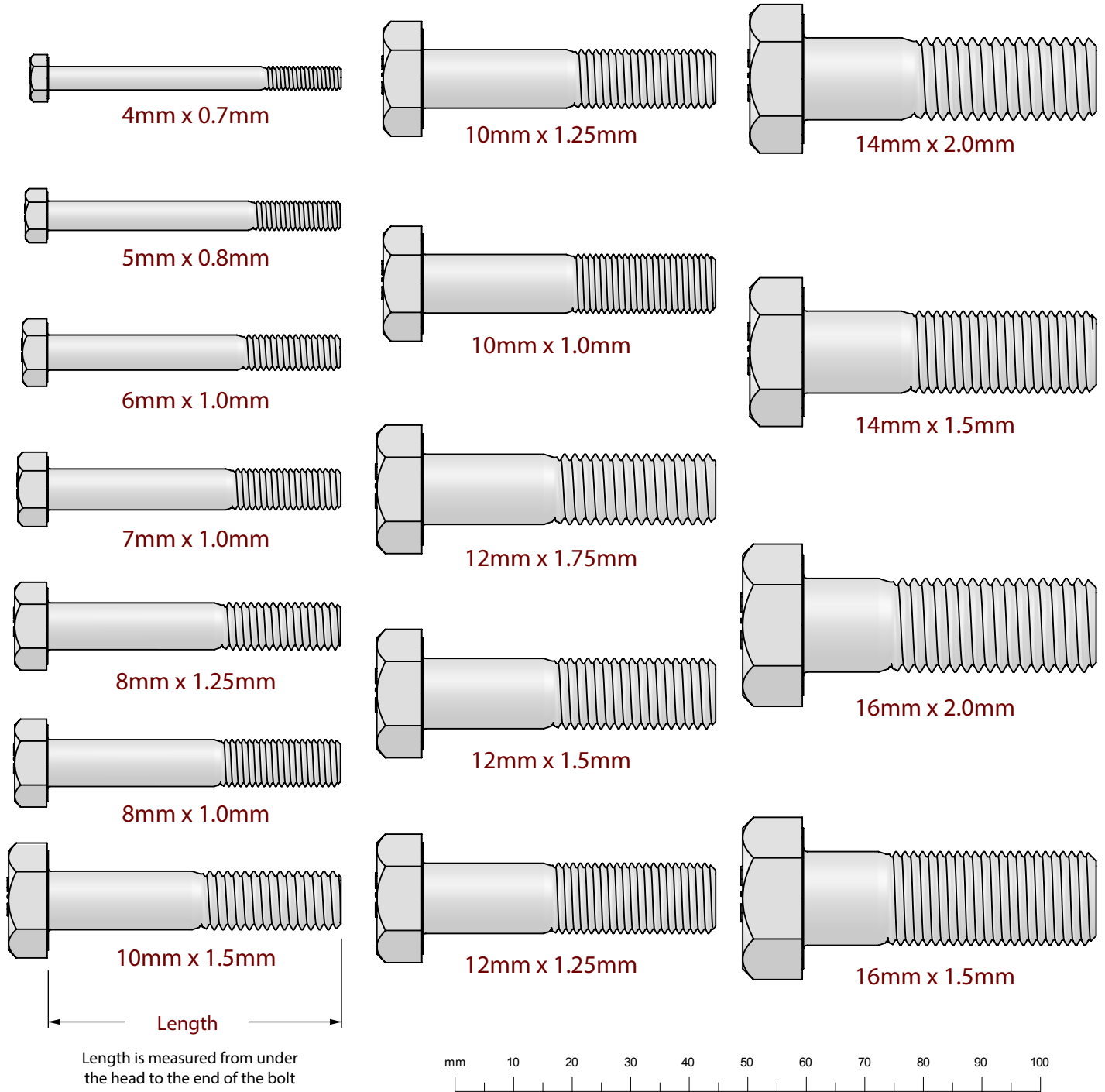
**IMPORTANT:** Make sure to print this chart to Actual Size (no scaling).  
After printing, measure the scale check below to ensure correct scale. See [boltdepot.com/tools](http://boltdepot.com/tools) for more details.



# Standard Metric Hex Bolt Sizes and Thread Pitches

www.boltdepot.com/tools

(Note: Head sizes may differ from what is shown due to differences between metric standards)



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**IMPORTANT:** Make sure to print this chart to **Actual Size** (no scaling). After printing, measure the scale check below to ensure correct scale. See [boltdepot.com/tools](http://boltdepot.com/tools) for more details.

0 1 2 3 4 5 6 inches

# DECIMAL EQUIVALENTS

METRIC - GREEN

FRACTIONAL - RED

WIRE GAGE - PURPLE

LETTER SIZE - BLUE



DRILL SIZE	DECIMAL INCHES	DRILL SIZE	DECIMAL INCHES	DRILL SIZE	DECIMAL INCHES	DRILL SIZE	DECIMAL INCHES	DRILL SIZE	DECIMAL INCHES
0.3mm	.0118	1.75mm	.0689	4.1mm	.1614	L	.2900	33/64	.5156
0.32mm	.0126	50	.0700	4.2mm	.1654	7.4mm	.2913	13.2mm	.5197
80	.0135	1.8mm	.0709	19	.1660	M	.2950	17/32	.5312
0.35mm	.0138	1.85mm	.0728	4.3mm	.1693	7.5mm	.2953	13.5mm	.5315
79	.0145	49	.0730	18	.1695	19/64	.2969	13.8mm	.5433
0.38mm	.0150	1.9mm	.0748	11/64	.1719	7.6mm	.2992	35/64	.5469
1/64	.0156	48	.0760	17	.1730	N	.3020	14.0mm	.5512
0.4mm	.0157	1.95mm	.0768	4.4mm	.1732	7.7mm	.3031	14.25mm	.5610
78	.0160	5/64	.0781	16	.1770	7.8mm	.3071	9/16	.5625
0.42mm	.0165	47	.0785	4.5mm	.1772	7.9mm	.3110	14.5mm	.5709
0.45mm	.0177	2.0mm	.0787	15	.1800	5/16	.3125	37/64	.5781
77	.0180	2.05mm	.0807	4.6mm	.1811	8.0mm	.3150	14.75mm	.5807
0.48mm	.0189	46	.0810	14	.1820	O	.3160	15.0mm	.5906
0.5mm	.0197	45	.0820	4.7mm	.1850	8.1mm	.3189	19/32	.5938
76	.0200	2.1mm	.0827	3/16	.1875	8.2mm	.3228	15.25mm	.6004
75	.0210	2.15mm	.0846	4.8mm	.1890	P	.3230	39/64	.6094
0.55mm	.0217	44	.0860	11	.1910	8.3mm	.3268	15.5mm	.6102
74	.0225	2.2mm	.0866	4.9mm	.1929	21/64	.3281	15.75mm	.6201
0.6mm	.0236	2.25mm	.0886	10	.1935	8.4mm	.3307	5/8	.6250
73	.0240	43	.0890	9	.1960	Q	.3320	16.0mm	.6299
0.62mm	.0244	2.3mm	.0906	5.0mm	.1969	8.5mm	.3346	16.25mm	.6398
72	.0250	2.35mm	.0925	8	.1990	8.6mm	.3386	41/64	.6406
0.65mm	.0256	42	.0935	5.1mm	.2008	R	.3390	16.5mm	.6496
71	.0260	3/32	.0938	7	.2010	8.7mm	.3425	21/32	.6562
0.7mm	.0276	2.4mm	.0945	13/64	.2031	11/32	.3438	16.75mm	.6594
70	.0280	41	.0960	6	.2040	8.8mm	.3465	17.0mm	.6693
69	.0292	2.45mm	.0965	5.2mm	.2047	S	.3480	43/64	.6719
0.75mm	.0295	40	.0980	5	.2055	8.9mm	.3504	17.25mm	.6791
68	.0310	2.5mm	.0984	5.3mm	.2087	9.0mm	.3543	11/16	.6875
1/32	.0312	39	.0995	4	.2090	T	.3580	17.5mm	.6890
0.8mm	.0315	38	.1015	5.4mm	.2126	9.1mm	.3583	45/64	.7031
67	.0320	2.6mm	.1024	3	.2130	23/64	.3594	18.0mm	.7087
66	.0330	37	.1040	5.5mm	.2165	9.2mm	.3622	23/32	.7188
0.85mm	.0335	2.7mm	.1063	7/32	.2188	9.3mm	.3661	18.5mm	.7283
65	.0350	36	.1065	5.6mm	.2205	U	.3680	47/64	.7344
0.9mm	.0354	7/64	.1094	2	.2210	9.4mm	.3701	19.0mm	.7480
64	.0360	35	.1100	5.7mm	.2244	9.5mm	.3740	3/4	.7500
63	.0370	2.8mm	.1102	1	.2280	3/8	.3750	49/64	.7656
0.95mm	.0374	34	.1110	5.8mm	.2283	V	.3770	19.5mm	.7677
62	.0380	33	.1130	5.9mm	.2323	9.6mm	.3780	25/32	.7812
61	.0390	2.9mm	.1142	A	.2340	9.7mm	.3819	20.0mm	.7874
1.0mm	.0394	32	.1160	15/64	.2344	9.8mm	.3858	51/64	.7969
60	.0400	3.0mm	.1181	6.0mm	.2362	W	.3860	20.5mm	.8071
59	.0410	31	.1200	B	.2380	9.9mm	.3898	13/16	.8125
1.05mm	.0413	3.1mm	.1220	6.1mm	.2402	25/64	.3906	21.0mm	.8268
58	.0420	1/8	.1250	6.2mm	.2420	10.0mm	.3937	53/64	.8281
57	.0430	3.2mm	.1260	D	.2441	X	.3970	27/32	.8438
1.1mm	.0433	30	.1285	6.3mm	.2460	10.2mm	.4016	21.5mm	.8465
1.15mm	.0453	3.3mm	.1299	6.4mm	.2500	Y	.4040	55/64	.8594
56	.0465	3.4mm	.1339	1/4	.2500	13/32	.4062	22.0mm	.8661
3/64	.0469	29	.1360	6.5mm	.2520	Z	.4130	7/8	.8750
1.2mm	.0472	3.5mm	.1378	F	.2559	10.5mm	.4134	22.5mm	.8858
1.25mm	.0492	28	.1405	6.6mm	.2570	27/64	.4219	57/64	.8906
1.3mm	.0512	9/64	.1406	G	.2598	10.8mm	.4252	23.0mm	.9055
55	.0520	3.6mm	.1417	6.7mm	.2610	11.0mm	.4331	29/32	.9062
1.35mm	.0531	27	.1440	6.8mm	.2638	7/16	.4375	59/64	.9219
54	.0550	3.7mm	.1457	17/64	.2656	11.2mm	.4409	23.5mm	.9252
1.4mm	.0551	26	.1470	H	.2660	11.5mm	.4528	15/16	.9375
1.45mm	.0571	25	.1495	6.9mm	.2677	29/64	.4531	24.0mm	.9449
1.5mm	.0591	3.8mm	.1496	I	.2717	11.8mm	.4646	61/64	.9531
53	.0595	24	.1520	7.0mm	.2720	15/32	.4688	24.5mm	.9646
1.55mm	.0610	3.9mm	.1535	J	.2756	12.0mm	.4724	31/32	.9688
1/16	.0625	23	.1540	7.1mm	.2770	12.2mm	.4803	25.0mm	.9843
1.6mm	.0630	5/32	.1562	K	.2795	31/64	.4844	63/64	.9844
52	.0635	22	.1570	7.2mm	.2810	12.5mm	.4921	1"	1.0000
1.65mm	.0650	4.0mm	.1575	9/32	.2812	1/2	.5000		
1.7mm	.0669	21	.1590	7.3mm	.2835	12.8mm	.5039		
51	.0670	20	.1610		.2874	13.0mm	.5118		