



United Fastener &
Supply Co.

**PRODUCT &
REFERENCE GUIDE**

cut fastener costs

Here are some basic rules for maintaining high quality and cutting fastener costs.

USE STANDARD DESIGN FASTENERS WHEREVER POSSIBLE.

SPECIFY COLD-HEADED PARTS . . .
for most strength and lowest cost.

CUT VARIETY OF STANDARD TYPES AND SIZES

Larger inventory of fewer parts means less stocking and ordering headaches, lower drilling, punching and tooling costs; avoids high cost of small quantity orders.

USE THESE TOLERANCES FOR ECONOMY

Diameters: Frac. ±.015, Dec. ±.003
Lengths: Frac. ±1/64, Dec. ±.010
Angles: ±2°, Drilled holes: ±.005

USE CLASS 2A and 2B THREAD TOLERANCES

Class 2A external thread to fit class 2B internal thread is the most frequently used thread tolerance. This gives a general purpose fit, providing sufficient clearance to minimize galling or seizing in driving. Also, the class 2A thread form allows for a minimum plating buildup.

USE LOW CARBON MATERIAL . . .
wherever possible.

USE HEAT TREATED FASTENERS . . .
for more strength in smaller sizes to reduce size, weight and cost.

AVOID SHARP CORNERS . . .
they increase cost.

USE MULTI-OPERATION FASTENERS

Fasteners can do more than just hold two parts together. They can replace an assembly operation, replace extra parts or perform other functions. Examples: thread-cutters, thread-formers, self-sealers, self-locking sems, gear-heads, etc.

DON'T USE CUSTOM DESIGNED FASTENERS . . .
unless no standard screw design will suffice for the job.

USE SURFACE TREATED SCREWS FOR FASTENING NON-COMPATIBLE MATERIALS . . .
minimizes galvanic action with mating parts.

ORDER MAXIMUM QUANTITY . . .

to be used for certain period of time even though delivered at different times. Allow enough lead time.

GIVE US UP-TO-DATE DRAWINGS AND SPECIFICATIONS

Include a sample part if available.

GIVE FASTENER USE AND APPLICATION METHOD

Sometimes, newer, more efficient or lower cost fasteners can be recommended for economy.

THE REAL COST OF FASTENERS

Purchase price is not a fastener's real cost. The full cost is "in-place" cost. That is, purchase price plus labor cost to install plus the down-time cost and added labor to replace it if it breaks or fails on the assembly line plus any replacement costs necessary in the field. REAL COST or in-place cost of a fastener can be 5 to 20 times the purchase price.

Hold the REAL COST down! Order fasteners capable of doing the job they are intended for—not necessarily the cheapest.

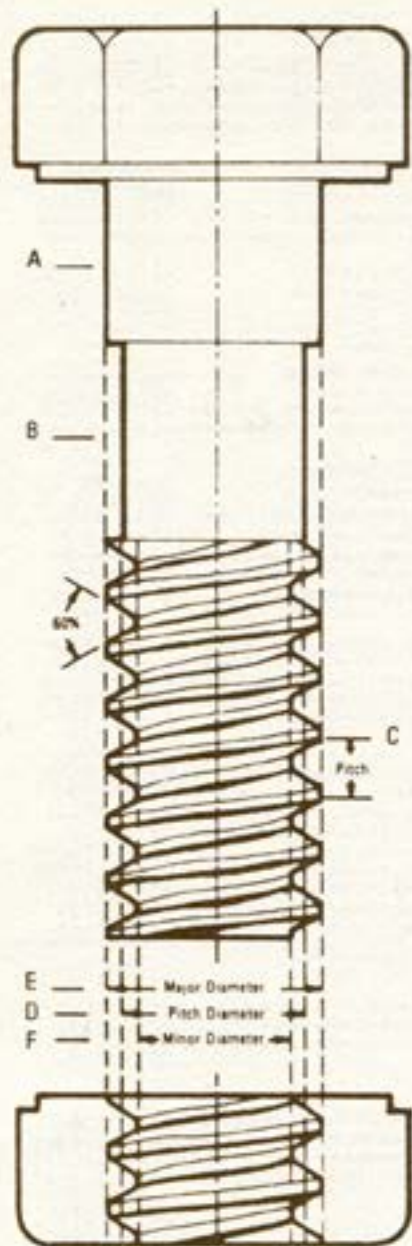
USE SPECIAL DESIGN FASTENERS

When no standard screw design will suffice for a specific application. Special, custom designed fasteners can provide great cost savings although the initial cost of designing, tooling and testing may seem high. Two or three expensive parts can sometimes be replaced by a one piece special cold-headed fastener that has a lower in-place cost and is superior in quality. Also, special designs can be developed to save assembly time or perform more product operations.

SIZE	COARSE UNC	FINE UNF	BASIC MAJOR DIAM.	SIZE	COARSE UNC	FINE UNF	8 THRD. SERIES	BASIC MAJOR DIAM.
0		80	.0600	1"	8	12 14	8	1.000
1	64	72	.0730	1-1/8	7	12	8	1.125
2	56	64	.0860	1-1/4	7	12	8	1.250
3	48	56	.0990	1-3/8	6	12	8	1.375
4	40	48	.1120	1-1/2	6	12	8	1.500
5	40	44	.1250	1-5/8	5-1/2		8	1.625
6	32	40	.1380	1-3/4	5		8	1.750
8	32	36	.1640	1-7/8	5		8	1.875
10	24	32	.1900	2	4-1/2		8	2.000
12	24	28	.2160	2-1/4	4-1/2		8	2.250
1/4	20	28	.2500	2-1/2	4		8	2.500
5/16	18	24	.3125	2-3/4	4		8	2.750
3/8	16	24	.3750	3	4		8	3.000
7/16	14	20	.4375	3-1/4	4		8	3.250
1/2	13	20	.5000	3-1/2	4		8	3.500
9/16	12	18	.5625	3-3/4	4		8	3.750
5/8	11	18	.6250	4	4		8	4.000
3/4	10	16	.7500					
7/8	9	14	.8750					

KEYS FIT THESE PRODUCTS WRENCH SELECTION GUIDE

Wrench	Cap Screws 1960 Series	Flat Head Cap Screws	Button Head Cap Screws	Set Screws	Shoulder Screws	Pressure Plugs	Wrench
.028				0			.028
.035		0	0	1.2			.035
.050	0	1.2	1.2	3.4			.050
1/16	1	3.4	3.4	5.6			1/16
5/64	2.3	5.6	5.6	8			5/64
3/32	4.5	8	8	10			3/32
7/64	6	10	10	1/4	1/4		7/64
1/8							1/8
9/64	8						9/64
5/32	10	1/4	1/4	5/16	5/16	1/16	5/32
3/16	1/4	5/16	5/16	3/8	3/8	1/8	3/16
7/32		3/8	3/8	7/16			7/32
1/4	5/16	7/16		1/2	1/2	1/4	1/4
5/16	3/8	1/2	1/2	5/8	5/8	3/8	5/16
3/8	7/16, 1/2	5/8	5/8	3/4	3/4	1/2	3/8
7/16							7/16
1/2	5/8	3/4		7/8	1		1/2
9/16				1, 1 1/8		3/4	9/16
5/8	3/4			1 1/4, 1 3/8	1 1/4	1	5/8
3/4	7/8, 1			1 1/2		1 1/4	3/4
7/8	1 1/8, 1 1/4						7/8
1	1 3/8, 1 1/2			1 3/4, 2		1 1/2, 2	1



A. FULL DIAMETER SHANK: Equal to major diameter of thread. Produced by cut thread or by roll thread on extruded blank. Characteristic of machine bolts and cap screws.

B. UNDERSIZED SHANK: Equal approximately to pitch diameter of thread. Produced by roll threading a non-extruded blank. Characteristic of machine screws.

C. PITCH: The distance from a point on the screw thread to a corresponding point on the next thread measured parallel to the axis.

D. PITCH DIAMETER: The simple, effective diameter of screw thread. Approximately half way between the major and minor diameters.

E. MAJOR DIAMETER: The largest diameter of a screw thread.

F. MINOR DIAMETER: The smallest diameter of a screw thread.

LEAD: The distance a screw thread advances axially in one turn.

CUT THREAD: Threads are cut or chased; the unthreaded portion of shank will be equal to major diameter of thread.

ROLLED THREAD: Threads are cold formed by squeezing the blank between reciprocating serrated dies. This acts to increase the major diameter of the thread over and above the diameter of unthreaded shank (if any), unless an extruded blank is used.

Classes of thread are distinguished from each other by the amounts of tolerance and allowance specified. External or bolt threads are designated with the suffix "A"; internal or nut threads with "B".

CLASSES 1A and 1B: For work of rough commercial quality where loose fit for spin-on-assembly is desirable.

CLASSES 2A and 2B: The recognized standard for normal production of the great bulk of commercial bolts, nuts and screws.

CLASSES 3A and 3B: Used where a close fit between mating parts for high quality work is required.

CLASS 4: A theoretical rather than practical class, now obsolete.

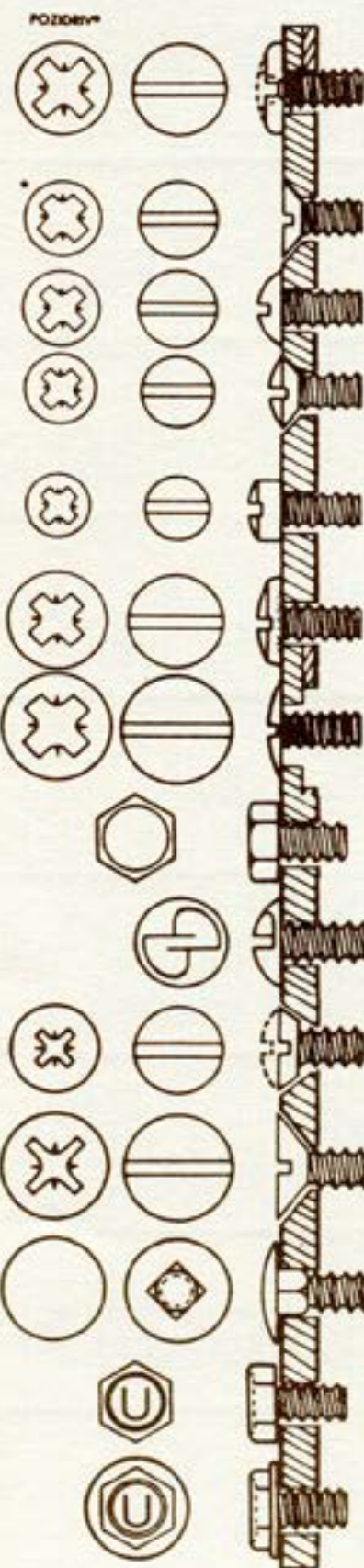
CLASS 5: For a wrench fit. Used principally for studs and their mating tapped holes. A force fit requiring the application of high torque for semi-permanent assembly.

HOW TO MEASURE FASTENERS



ALWAYS MEASURE FROM THE BEARING SURFACE TO THE END OF THE FASTENER.

Types of Bolt and Screw Heads



PAN HEAD: Recommended for new designs to replace round, truss and binding heads. Provides a low large diameter head, but with characteristically high outer edge along the outer periphery of the head where driving action is most effective for high tightening torques. Slightly different head contour where supplied with recessed head. See dotted line.

FLAT HEAD: Supplied to standard dimensions with an 80° to 82° angle to be used where finished surfaces require a flush fastening unit. The countersunk portion offers good centering possibilities.

ROUND HEAD: Not recommended for new design (see pan head). This head was the most universally used design in the past.

OVAL HEAD: Fully specified as "oval countersunk", this head is identical to the standard flat head, but possesses, in addition, a rounded, neat appearing upper surface for attractiveness of design.

FILLISTER HEAD: The standard oval fillister head has a smaller diameter than the round head, but is higher with a correspondingly deeper slot. The smaller diameter head increases the pressure applied on the smaller area and can be assembled close to flanges and raised surfaces. Headed in counterbored dies to insure concentricity, they may be used successfully in counterbored holes.

BINDING HEAD (Straight Side): Most generally used in electrical and radio work because of its identifying undercut beneath the head, which binds and eliminates fraying of stranded wire. Offers an attractively designed, medium-low head with ordinarily sufficient bearing surface. Not ordinarily recommended as a Phillips Recessed head—see Pan Head for better functional design.

TRUSS HEAD: Also known as oven head, stove head, and oval binding head. A low, neat appearing, large diameter head having excellent design qualities, and as illustrated can be used to cover larger diameter clearance holes in sheet metal when additional play in assembly tolerance is required. Suggest pan head as a substitute.

HEXAGON HEAD (TRIMMED): This is the standard type of wrench-applied hexagon head, characterized by clean, sharp corners trimmed to close tolerances. Recommended for general applications, it is available in all standard patterns and in all thread diameters.

ONE-WAY HEAD: This ingenious, tamper-proof type of head, once assembled cannot be removed, yet is driven with a standard screw driver. Manufactured with amazing economy in productive quantities, this simple design can frequently solve costly assembly problems.

FLAT AND OVAL HEADS (UNDERCUT): This is the standard flat or oval head 80° to 82° countersunk screw which has the lower one-third of the countersunk portion removed to facilitate production of extremely short lengths. As illustrated, it will fit a standard counterbored hole and is particularly adaptable to flush assemblies in this stock.

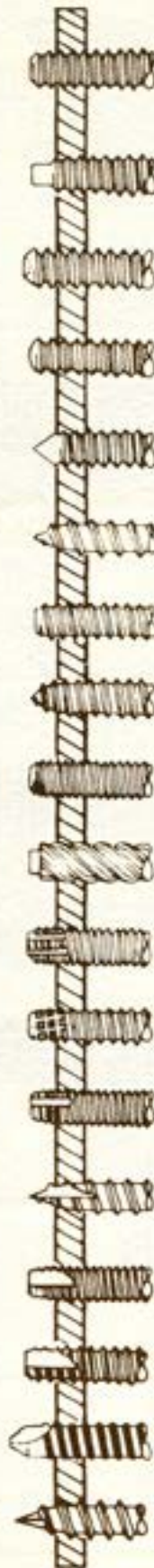
FLAT HEAD (100° COUNTERSUNK): This special flat head screw has been developed for applications requiring flush surfaces, and is recommended for use in soft materials, to distribute pressure over a larger and less angular surface. Very well adapted for use with thin aluminum, soft plastics, etc.

SQUARE SHOULDER SCREWS: An adaptation of the standard carriage bolt design. Possesses a truss head on a square shank which resists rotation when located or driven into place. This square shoulder may also be staked into place as a permanent fastener. A great many varieties in all screw diameters are available in productive quantities.

INDENTED HEXAGON: An inexpensive wrench head fastener made to standard hexagon head dimensions. The hex is completely cold upset in a counterbored die and possesses an identifying depression in the top surface of the head.

INDENTED HEXAGON WASHER HEAD: Produced in the same manner as the standard indented hexagon head but with a washer section at the base of the head to protect the finish of the assembly from wrench disfigurement.

Tapping, Machine & Set Screw Points



DIE POINT: One of the least expensive pointing operations applied at the time of heading. This operation provides an end chamfer starting with a diameter smaller than the root diameter of the thread. The minimum reduction of the point is approximately 10% below the maximum minor diameter with an included angle of 40 to 50.

DOG POINT: A straight pointed section reduced in diameter slightly below the root diameter of the thread, usually extending in length about two-thirds the diameter of the thread. Recommended for ease in starting, to insure against stripping fine threaded products, and to increase efficiency along production lines.

CUPPED POINT: A special cup section supplied on the end of the threaded member having a depression in the end to reduce the area in contact with the surface which increases its holding and locking power under pressure.

ROUND POINT: A dome-like rounded surface applied to the end of a threaded member in order to offer pressure without displacement. Used for adjusting members where friction without cutting action is desirable.

CONE POINT: A precision forming operation to provide any required included angle. Offers a smooth surface, accurate length, and a sharp point which can be produced to any desired contour to fit your particular requirements.

TYPE A POINT: A thread forming screw for use in thin metal .015 to .050 thick. Used with drilled, punched or nested holes in sheet metal, resin impregnated plywood, asbestos combinations, among others. Not recommended for new design.

TYPE B POINT: A thread forming screw for use in heavier metal .050 to .200 thick. Larger root diameter with finer thread pitch for light and heavy sheet metal non-ferrous castings, plastics, impregnated plywoods, asbestos combinations, and other materials.

TYPE AB POINT: A thread forming screw combining locating type point of Type A with thread size and pitch of Type B. Normal limitations of Type B apply.

TYPE C POINT: A thread forming screw with either coarse or fine pitch machine screw thread and blunt tapered point. Eliminates chips and permits replacement with standard screw in the field. Higher driving torque required. Usable in heavy sheet metal and die castings.

TYPE U POINT: A thread forming screw with high Helix thread for driving or hammering into sheet metal, castings, fiber or plastics for permanent, quick assemblies.

TYPE F POINT: A thread cutting screw with machine screw thread with blunt tapered point, having multi-cutting edges and chip cavities. For heavy gauge sheet metal, aluminum, zinc and lead die castings, cast iron, brass and plastic.

TYPE FZ POINT: A thread cutting screw with a tapping screw thread with blunt tapered point and multi-cutting edges and chip cavities. For plastics, die castings, metal clad and resin impregnated plywoods, and asbestos.

TYPE 1 POINT: A thread cutting screw with single flute for general use. Produces a fine standard machine screw thread for field replacement.

TYPE 17 POINT: A thread cutting screw for wood with a coarse tapping screw thread and a special long sharp point fluted to capture chips.

TYPE 23 POINT: A thread cutting screw in the fine thread series offering maximum thread cutting area and excellent chip cleaning, with minimum tightening torques.

TYPE 25 POINT: A thread cutting screw similar to Type 23 point except with coarse Type B thread. For plastics and other soft materials with large chip cleaning and cutting edges.

SELF-DRILLING TKS: With special driving points—lengths—diameters that will drill through "x" metal. Eliminates all hole preparation—drills faster than a drill. No punching, drilling or tapping required. Reduces die costs.

SELF-DRILLING: Produces more secure sheet metal assemblies faster. Used as self-drilling screw or driving thru pre-punched holes. Can be used with or without pilot holes. Positive rake "forward cutting edge" drills straight thru sheet metal at peak speed. Perfectly mated threads increase strip and back out pressures.

DRIVERS



Phillips



Slotted Head



Clutch Head



Hexagon Washer Head



Hexagon Head



Combination Phillips/Slot



Hexagon




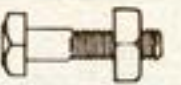
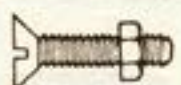

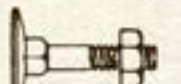
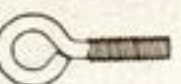
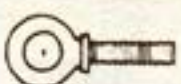
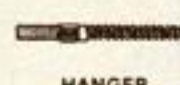

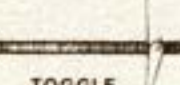
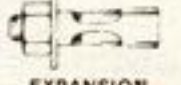


Tamper Proof



Tamper Proof

BOLTS

 CARRIAGE	 STEP	 HEX	 SQUARE	 STOVE	
 FLOW	 ELEVATOR	<i>THE ABOVE BOLTS WHEN FURNISHED WITHOUT NUTS MAY BE REFERRED TO AS SCREWS</i>		 TURNED EYEBOLT	 FORGED EYEBOLT
 HANGER	 STUD			 TOGGLE	 EXPANSION	FOUNDATION (HOOK BOLT)

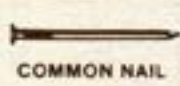
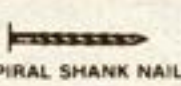
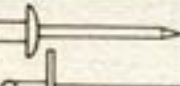

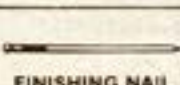
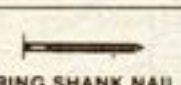
NUTS

 HEX (MACHINE SCREW)	 SQUARE (MACHINE SCREW)	 REGULAR SQUARE	 CASTLE	 METAL LOCK	 TEE	 FORGED WING
 HEX FINISHED	 ACORN OR CAP	 WELD	 KEPS	 NYLON INSERT	 PALLET	 STAMPED WING

WASHERS

 USS FLAT	 SAE FLAT	 FINISHING	 TORQUE	 INTERNAL TOOTH	 EXTERNAL TOOTH	 INT.-EXT. TOOTH	 SPLIT LOCK
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MISCELLANEOUS

 COMMON NAIL	 SPIRAL SHANK NAIL	 BLIND RIVETS	 SPECIAL
 FINISHING NAIL	 RING SHANK NAIL		
<i>PLUS SPIKES AND MORE</i>		<i>PLUS SOLID SEMI-TUBULAR AND MORE...</i>	

- **PINS:** CLEVIS - DOWEL - COTTER - SPRING - TAPER - STRAIGHT - GROOVE and SPECIAL ORDER
- **SCREW MACHINE PRODUCTS:** BROWN & SHARPE - DAVENPORT SWISS AUTOMATIC
- **MATERIALS:** STEEL - BRASS - BRONZE - ALUMINUM - NYLON - STAINLESS STEEL and OTHERS

NYLON

MACHINE SCREWS	SPACERS & STAND-OFFS:
HEX HEAD CAP SCREWS	ROUND & HEX
NUTS	TAPPED & PLAIN
WASHERS	SCREW INSULATORS
SOCKET CAP & SET SCREWS	

METRIC FASTENERS

MACHINE SCREWS	SELF-TAPPING SCREWS
HEX HEAD CAP SCREWS	THREADED ROD, STUDS
SOCKET CAP & SETS	PINS
NUTS	RIVETS
WASHERS	KEYS

SCREWS

MACHINE SCREWS	SELF-DRILLING TEKS
WOOD SCREWS	SOCKET CAP & SET SCREWS
SHEET METAL SCREWS	SELF-LOCKING SCREWS

CONSTRUCTION HARDWARE:
EXPANSION ANCHORS, CHAIN
U-BOLTS, EYE BOLTS, S HOOKS

ELECTRONIC HARDWARE:
PANEL NUTS, MINIATURES
INSERTS, SPACERS & STAND-OFFS

DECIMAL and MILLIMETER EQUIVALENTS

DECIMALS		MILLIMETERS	DECIMALS		MILLIMETERS	MM	INCHES	MM	INCHES			
	$\frac{1}{64}$	0.015625	—	$\frac{33}{64}$	0.515625	—	13.097	.1	.0039	46	—	1.8110
$\frac{1}{32}$	$\frac{3}{64}$	.03125	—	$\frac{35}{64}$	.53125	—	13.494	.2	.0079	47	—	1.8504
	$\frac{5}{64}$	.078125	—	$\frac{37}{64}$	.578125	—	14.684	.3	.0118	48	—	1.8898
$\frac{1}{16}$	$\frac{7}{64}$	.109375	—	$\frac{39}{64}$	.609375	—	15.478	.4	.0158	49	—	1.9291
	$\frac{9}{64}$	.140625	—	$\frac{41}{64}$	.640625	—	16.272	.5	.0197	50	—	1.9685
$\frac{3}{32}$	$\frac{11}{64}$	.171875	—	$\frac{43}{64}$	.671875	—	17.066	.6	.0236	51	—	2.0079
	$\frac{13}{64}$	.203125	—	$\frac{45}{64}$	.703125	—	17.859	.7	.0276	52	—	2.0472
$\frac{1}{8}$	$\frac{15}{64}$	.234375	—	$\frac{47}{64}$	.734375	—	18.653	.8	.0315	53	—	2.0866
	$\frac{17}{64}$	.265625	—	$\frac{49}{64}$	.765625	—	19.447	.9	.0354	54	—	2.1260
$\frac{5}{32}$	$\frac{19}{64}$	.296875	—	$\frac{51}{64}$	.796875	—	20.241	1	.0394	55	—	2.1654
	$\frac{21}{64}$	.328125	—	$\frac{53}{64}$	.828125	—	21.034	2	.0787	56	—	2.2047
$\frac{3}{16}$	$\frac{23}{64}$	.359375	—	$\frac{55}{64}$	.859375	—	21.828	3	.1181	57	—	2.2441
	$\frac{25}{64}$	.390625	—	$\frac{57}{64}$	.890625	—	22.622	4	.1575	58	—	2.2835
$\frac{1}{4}$	$\frac{27}{64}$	.421875	—	$\frac{59}{64}$	.921875	—	23.416	5	.1969	59	—	2.3228
	$\frac{29}{64}$	.453125	—	$\frac{61}{64}$	.953125	—	24.209	6	.2362	60	—	2.3622
$\frac{5}{8}$	$\frac{31}{64}$	.484375	—	$\frac{63}{64}$	.984375	—	25.003	7	.2756	61	—	2.4016
	$\frac{33}{64}$	.5000	—	1	1.000	—	25.400	8	.3150	62	—	2.4409
								9	.3543	63	—	2.4803
								10	.3937	64	—	2.5197
								11	.4331	65	—	2.5591
								12	.4724	66	—	2.5984
								13	.5118	67	—	2.6378
								14	.5512	68	—	2.6772
								15	.5906	69	—	2.7165
								16	.6299	70	—	2.7559
								17	.6693	71	—	2.7953
								18	.7087	72	—	2.8346
								19	.7480	73	—	2.8740
								20	.7874	74	—	2.9134
								21	.8268	75	—	2.9528
								22	.8661	76	—	2.9921
								23	.9055	77	—	3.0315
								24	.9449	78	—	3.0709
								25	.9843	79	—	3.1102
								26	1.0236	80	—	3.1496
								27	1.0630	81	—	3.1890
								28	1.1024	82	—	3.2283
								29	1.1417	83	—	3.2677
								30	1.1811	84	—	3.3071
								31	1.2205	85	—	3.3465
								32	1.2598	86	—	3.3858
								33	1.2992	87	—	3.4252
								34	1.3386	88	—	3.4646
								35	1.3780	89	—	3.5039
								36	1.4173	90	—	3.5433
								37	1.4567	91	—	3.5827
								38	1.4961	92	—	3.6220
								39	1.5354	93	—	3.6614
								40	1.5748	94	—	3.7008
								41	1.6142	95	—	3.7402
								42	1.6535	96	—	3.7795
								43	1.6929	97	—	3.8189
								44	1.7323	98	—	3.8583
								45	1.7717	99	—	3.8976
								100	—	100	—	3.9370

1 mm = .03937"

.001" = .0254 mm

National Bureau of Standards Miscellaneous Publication 286