

# Chapter 15

## Manufacturing Engineering

### SUMMARY

The introduction of metric drill sizes to manufacturing creates an opportunity to rationalize the number of drills used. Table 15-1 shows some preferred metric drill sizes, together with the customary inch fraction, number, and letter sizes. The table shows all sizes in decimal millimeter or inch, and it makes it convenient to phase out non-preferred inch sizes.

### INTRODUCTION

Standards<sup>1</sup> for small tools used in removing material from work pieces are being developed worldwide by ISO Technical Committee TC 29. Metric standards for various types of cutting tools are very important, since they tie in with most other metric standards of parts and components in the mechanical design field. The use of metric threaded fasteners, for example, might require drill sizes for clearance and tapping holes, and a metric cutting tool for the counter-bores.

Metric cutting tool standards in this chapter enable one to find the most important dimensions, as well as references to other national standards on the subject.

<sup>1</sup>For information about the term “standard” as used in this book, please see p. 12.

### TWIST DRILLS

World standards for parallel shank and Morse taper-shank twist drills have been used by countries already on the metric system for years. The metric diameters for twist drills have been selected from an arithmetic number series where the difference between one size and the next smaller size remains constant. A selection of nominal diameters, based on the preferred number series, would reduce the number of standard sizes substantially, and a preferred number diameter series has been under consideration by TC 29.

### LIMITS OF TOLERANCE ON DIAMETER

The tolerance on diameter, as measured across the lands at the outer corners, is h8 as specified in the ISO System of Limits and Fits (see Table 6-22).

### TOLERANCE ON LENGTH

Each flute and overall length may vary between the values specified for the range in question and those specified in the general tables for the ranges immediately above and below.

In the case of taper-shank drills, if the next larger or smaller overall length is associated with a different taper shank from that of the length in question, then the permissible upper or lower limit must be that of the next larger or smaller overall length minus the difference between the lengths of the taper shanks concerned.

### PARALLEL-SHANK TWIST DRILLS

Parallel-shank twist drills are generally made of high speed steel.

Designation of a twist drill with long parallel shank (see Table 15-4), 30-mm diameter, and made of high-speed steel, is as follows: Long Twist Drill 30 BS 328, Part 1.

**TABLE 15-1 DRILL SIZES WITH DECIMAL EQUIVALENTS**

DRILL SIZE		DECIMALS	
mm	INCH	mm	INCH
<b>0.1</b>			0.0039
	NO.97	0.15	0.0059
	NO.96	0.16	0.0063
	NO.95	0.17	0.0067
	NO.94	0.18	0.0071
	NO.93	0.19	0.0075
	NO.92	0.2	0.0079
<b>0.2</b>			0.0079
	NO.91	0.21	0.0083
	NO.90	0.22	0.0087
	NO.89	0.23	0.0091
	NO.88	0.24	0.0095
	NO.87	0.25	0.01
	NO.86	0.27	0.0105
	NO.85	0.28	0.011
	NO.84	0.29	0.0115
<b>0.3</b>			0.0118
	NO.83	0.3	0.012
	NO.82	0.32	0.0125
	NO.81	0.33	0.013
	NO.80	0.34	0.0135
<b>0.35</b>			0.0138
	NO.79	0.37	0.0145
	1/64	0.4	0.0156
<b>0.4</b>			0.0158
	NO.78	0.41	0.016
<b>0.45</b>			0.0177
	NO.77	0.46	0.018
<b>0.5</b>			0.0197
	NO.76	0.51	0.02
	NO.75	0.53	0.021
<b>0.55</b>			0.0217
	NO.74	0.57	0.0225
<b>0.6</b>			0.0236
	NO.73	0.61	0.024
	NO.72	0.64	0.025
<b>0.65</b>			0.0256
	NO.71	0.66	0.026
<b>GO</b>	<b>STOP</b>	<b>CAUTION</b>	

DRILL SIZE		DECIMALS	
mm	INCH	mm	INCH
<b>0.7</b>			0.0276
	NO.70	0.71	0.028
	NO.69	0.74	0.0292
<b>0.75</b>			0.0295
	NO.68	0.79	0.031
	1/32	0.8	0.0313
<b>0.8</b>			0.0315
	NO.67	0.81	0.032
<b>0.85</b>			0.033
	NO.66	0.84	0.0335
<b>0.85</b>			0.035
	NO.65	0.89	0.035
<b>0.9</b>			0.0354
	NO.64	0.91	0.036
	NO.63	0.94	0.037
<b>0.95</b>			0.0374
	NO.62	0.97	0.038
	NO.61	0.99	0.039
<b>1</b>			0.0394
	NO.60	1.02	0.04
	NO.59	1.04	0.041
<b>1.05</b>			0.0413
	NO.58	1.07	0.042
	NO.57	1.09	0.043
<b>1.1</b>			0.0433
			0.0453
<b>1.15</b>			0.0465
	NO.56	1.18	0.0469
	3/64	1.19	0.0472
<b>1.2</b>			0.0492
			0.0512
<b>1.25</b>			0.052
	NO.55	1.32	0.0531
<b>1.3</b>			0.0531
			0.055
<b>1.35</b>			0.0551
	NO.54	1.4	0.0571
<b>1.4</b>			0.0571
			0.0591
<b>1.45</b>			0.0591
<b>GO</b>	<b>STOP</b>	<b>CAUTION</b>	