

1.3 Preferred Values

The preferred values for fixed components are chosen so that all manufactured components are saleable as one nominal value or another. The nominal values are arranged in geometric progression based on the ratios:

$$\begin{array}{rcl} \sqrt[6]{10} & = & 1.46 \quad \text{for } \pm 20\% \text{ tolerance} \\ \sqrt[12]{10} & = & 1.21 \quad \text{for } \pm 10\% \text{ tolerance} \\ \sqrt[24]{10} & = & 1.10 \quad \text{for } \pm 5\% \text{ tolerance} \end{array}$$

The values so obtained are then rounded to two significant figures as shown in Table 1.1. From this table it is seen that a 220 Ω resistor is available with a tolerance of $\pm 20\%$, $\pm 10\%$ or $\pm 5\%$. A 50 k Ω resistor is *not* available in fixed composition construction and a 56 Ω resistor is available with either $\pm 10\%$ or $\pm 5\%$ tolerance.

Preferred RETMA values are standard for capacitors larger than 10 pF, but are not used for electrolytic units. Capacitance tolerance is expressed in pF for nominal capacitance values below 10 pF, and in percent for nominal capacitance values of 10 pF and larger. Frequently the tolerances on the higher valued capacitors (greater than 1000 pF) may be indicated by specifying their *guaranteed minimum value (GMV)* which is the smallest value expected from a component of an indicated type. In non-critical applications, such as bypassing, the GMV is of more concern to a circuit designer than the extreme range of capacitance values a selected component may have.

Tolerance	$\pm 20\%$	$\pm 10\%$	$\pm 5\%$
Percent Step Size	$\approx 40\%$	$\approx 20\%$	$\approx 10\%$
Step Multiplier	$\sqrt[6]{10}$	$\sqrt[12]{10}$	$\sqrt[24]{10}$
Values	10	10	10
	-	-	11
	-	12	12
	-	-	13
	15	15	15
	-	-	16
	-	18	18
	-	-	20
	22	22	22
	-	-	24
	-	27	27
	-	-	30
	33	33	33
	-	-	36
	-	39	39
	-	-	43
	47	47	47
	-	-	51
	-	56	56
	-	-	60
	68	68	68
	-	-	75
	-	82	82
	-	-	91
	100	100	100

Table 1.1

RETMA Preferred Values