Standard Resistor Values

Why is there no such thing as a 475 Ω resistor, unless you are looking for a precision resistor?

The simple answer is because resistors are not perfect. They have a tolerance, which means a given resistor will have a value that is its stated value, plus or minus a percentage. Common, low cost, resistors may have a tolerance of either 5% (the fourth colour band is gold) or 10% (the fourth colour band is silver).

Consider resistors with a 10% tolerance. If you start with a value of 100 Ω, then a given resistor with colour bands of brown-black-black-silver could have an actual resistance as low as 90 Ω or as high as 110 Ω. This makes it unnecessary to manufacture specific resistors in this range. The next value available in the 10% series is 120 Ω, but resistors with colour bands of brown-red-black-silver may have an actual resistance as low as 108 Ω or as high as 132 Ω.

Since each value may be ±10%, each value may be 20% higher than the previous one. This means that the 10% series consists of the following values with the first two colour bands shown here:

10	brown-black	33	orange-orange
12	brown-red	39	orange-white
15	brown-green	47	yellow-violet
18	brown-grey	56	green-blue
22	red-red	68	blue-grey
27	red-violet	82	grey-red

The third colour band provides the magnitude (power of 10) for the value of the resistor.

The 5% series works the same way, but since each resistor can vary by ±5%, each value is 10% higher than the previous one. This means that the 5% series consists of the following values with the first two colour bands shown here:

10	brown-black	33	orange-orange
11	brown-brown	36	orange-blue
12	brown-red	39	orange-white
13	brown-orange	43	yellow-orange
15	brown-green	47	yellow-violet
16	brown-blue	51	green-brown
18	brown-grey	56	green-blue
20	red-black	62	blue-red
22	red-red	68	blue-grey
24	red-yellow	75	violet-green
27	red-violet	82	grey-red
30	orange-black	91	white-brown