Vacuum Chuck Data

A total vacuum is minus 30 inches of Mercury, and is never achieved in practice. My pump regularly produces a vacuum of between minus 22 and minus 25 inches. In the following calculations I am going to assume a vacuum of minus 20 inches of mercury. This means that the figures given below are *conservative* figures. It also makes the arithmetic a little easier.

Full atmospheric pressure is close to 15 lb/square inch, so with a pump producing around 2/3 of a full vacuum the pressure achieved is about 10 lb/square inch.

Remember, the important area is the area of the *front face of the vacuum chuck*, not the size of the workpiece. The table shows this area for chucks of different diameters up to 12 inches and the overall force holding the workpiece onto the chuck.

Diameter/inches	Area/square inches	Overall force/lb
2	3.14	31.4
3	7.07	70.7
4	12.6	126
5	19.6	196
6	28.3	283
7	38.5	385
8	50.3	503
9	63.6	636
10	78.5	785
11	95.0	950
12	113.1	1131

It is worth noting that an 8 inch diameter chuck will hold the workpiece with a force only a little less than a quarter of a ton, and this increases to well over half a ton with a 12 inch diameter chuck. It has to be considered whether the piece you want to hold can actually withstand such forces. Remember these are conservative estimates and the actual forces involved are likely to be even greater than this. I have found a chuck diameter of about 4 or 5 inches is suitable for most work.

It should also be remembered that the opposite is true. A two inch chuck only has a holding power of around 30 - 35 pounds. This is not very great, and only small items can be held in chucks as small as this, and only light work (eg. sanding) undertaken on them.

NB 1 cwt = 112 lb
¼ ton = 560 lb
½ ton = 1120 lb