Ratio of Plaster/Silica to Water

The proportion of plaster/silica to water is critical in order to fabricate a strong mold. If you don't add enough plaster/silica to the water, the ratio will be such that the mold will be soft and readily crack when subjected to heat. USG, a major manufacturer of plaster, recommends consistencies (proportions of plaster to water) and recommends that you weigh your materials. *Author's Note: The USG recommendations are for plaster to water and not for plaster/silica to water, but for our usage, we will use their calculations to estimate the ratio of plaster/silica to water. Weighing the plaster/silica to water defines the exact density of your mold.*

Once you've calculated the volume of investment you need, it is necessary to convert this information in weights of plaster/silica to water. It is assumed that you have subtracted the volume of the model to be cast from the volume of the mold box into which you will be pouring your plaster/silica into. Remember, we're working with cubic feet.

The next step is to select the consistency you will be using; low numbers equal higher density molds. The higher the number the faster the materials will set. It is really not necessary to go above 60 consistency. Most casters use 50 to 60 from the chart below. I use 55 and find this ratio quite adequate. Another important aspect of doing accurate measurement is that if you find it necessary to add more plaster/silica, the expansion and contraction of the different layers of your mold will be similar and you will not get any separation between those layers. For very large molds that require you to mix many batches of mold mix, this weighing method is very important.

Follow this Example

Multiply the cubic feet needed by the amount of both plaster/silica and water to give you the amount of each that you need. Example: The measurement of your mold box is 14" x 18" x 4". Using our calculation of length x width x height we find it to be 1008 cu. inches. This number is then divided by 1728, the cube root. Our answer is .5833 cu. ft. Now our model to be cast is 12 x 16 x 2; this calculation is 384 cu. inches or .2222 cu. ft. Subtract the model from the mold box and you get .3611. If we want a mold with a consistency of 55 we take .3611 and multiply it by 73 which gives us 26.3 lbs. of plaster/silica. Next we multiply .3611 by 40 which gives us 14.4 lbs. of water. If you have to divide up your final weights because it all won't fit into one bucket do it evenly. Divide the number of buckets into the weights of each. This may seem like a lot of effort, but it really takes all the guesswork out of making larger molds.

It is helpful when using this system to premix your plaster and silica in equal amounts. Both ship in 50 lb. bags.

Consistency	Plaster/Silica	Water	Total	
50	78	39	117	**Highest Density**
55	73	40	113	
60	68	41	109	
65	66	43	109	
70	62	43	105	**Lowest Density**
Plaster/Water ratio to make 1 cubic foot				

Consistency	Factor	Highest Density
50	2.3	
55	2.0	
60	1.8	
65	1.7	
70	1.5	**Lowest Density**

If you use the eyeball system to calculate the quantity of plaster/silica mixture, this chart might help you calculate the weight of plaster/silica to water.

To use: multiply the weight of the water in lbs. by the factor. The answer is the weight of plaster/silica.