Choosing The Correct Filling Gun

A guide for selecting the proper Filling Gun or Shuttle disk for any powder filling application. Use this guide for all Kinematics' Manual & Semi-Automatic Powder Fillers, including Models 1700, 2400, 4400/VC, 4400/TX, 4400/XTX and 4400/PVC.

Often, powder samples cannot be submitted to our laboratory for evaluation. This leaves the task of selecting the proper filling gun up to the customer. This should not strike fear into anyone's heart. It is a reasonably simple process. If you read and understand the filling principle, and follow the simple steps below, you will easily be able to determine the filling gun best suited to your particular application.

Filling principle...

First, understand that all Kinematics' manually operated and semi-automatic powder fillers are volumetric fillers. The filling gun or shuttle disk merely provides the volumetric chamber used to measure and dispense the dry product. If you know or can assume the approximate density of the product, it is simple to calculate the volume the required dose will occupy in the chamber of the filling gun or shuttle disk. The compacting action of the vacuum will reduce the volume slightly, approximately 10-20% depending on the product.

Follow These Simple Steps...

1 . Determine The Product's Density.
If you do not know the density of the substance, simply take a measuring cup or any container of known volume and fill it with the test product. Gently tap the cup a few times on a table top to compact the product slightly. Now, add more powder to refill the cup and weigh it. Make sure to tare out the weight of the container in order to get the actual net weight of the powder. The ratio of the product's weight to the volume of the cup is it's approximate density.

2 . Calculate the Required Volume for the Gun.
As an example, if we have a substance that fully occupies a 50 cc. container, and weighs 38.2 gm. And, if we need to have the filling gun be capable of dispensing 50 gm of that same product, our equation would be as follows:

$$V = \frac{50 \text{ cc.} \times 50 \text{ gm.}}{38.2 \text{ gm.}} = 65.45 \text{ cc.}$$

Therefore, the required filling gun needs to have a volume of at 65.45 cc.

3 . Pick a Gun.
From the chart of Standard Filling Gun Dimensions on page 2, choose the Ø1.0" filling gun as a good first approximation.

4 . Examine at the Container.
Next, look at the opening of the container into which the powder will be dosed. The barrels of most filling guns have O.D.'s that are approximately 2-3 mm. larger then their I.D.'s. It is always desirable to be able to fit the gun tip loosely inside the mouth of the container and to dispense the entire fill weight in a single dose. However, this is not always possible. In these cases, if the powder is free-flowing, we recommend choosing a gun which is larger than the container's opening but can dispense the full dose in a single shot through a funnel. If the product is non-free-flowing we usually recommend a gun small enough to fit within the mouth of the container, and a procedure of filling in multiple shots of one-half or one-third the desired fill weight.

5 . Select another filling gun if the first choice above will not accommodate the container.

6 . Call if you need further assistance. Our TOLL FREE number is 800-833-8103.

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Standard Filling Gun Sizes

Gun Dia. (I.D.)		Chamber Area		Theoretical Max. Length of Draw		Theoretical Max. Gun Volume	
IN.	MM.	$IN.^2$	$CM.^2$	IN.	CM.	$IN.^3$	$CM.^3$
* .063	1,60	.003	0,020	.313	0,79	.001	0,016
* .094	2,39	.007	0,045	.470	1,19	.003	0,054
* .125	3,17	.012	0,079	.625	1,59	.008	0,125
* .156	3,96	.019	0,123	.780	1,981	.015	0,243
* .188	4,77	.028	0,179	.940	2,388	.026	0,431
.219	5,56	.038	0,243	1.095	2,781	.042	0,682
* .250	6,35	.049	0,317	1.250	3,175	.061	1,004
* .312	7,92	.076	0,493	1.560	3,962	.119	1,943
* .375	9,52	.110	0,712	1.875	4,763	.206	3,380
.438	11,13	.151	0,973	2.190	5,563	.331	5,420
* .500	12,70	.196	1,27	2.500	6,350	.490	8,030
* .625	15,87	.307	1,98	3.125	7,938	.960	15,720
* .750	19,05	.442	2,85	3.750	9,525	1.658	27,160
* .875	22,22	.601	3,88	4.375	11,113	2.630	43,090
*1.125	28,57	.994	6,41	5.000	12,700	4.970	81,440
1.250	31,75	1.227	7,92	5.000	12,700	6.135	100,530
*1.500	38,10	1.767	11,40	5.000	12,700	8.835	144,800
‡1.750	44,45	2.405	15,52	5.000	12,700	12.025	197,050
‡2.000	50,80	3.142	20,27	5.000	12,700	15.710	257,440
‡2.500	63,50	4.909	31,67	5.000	12,700	24.545	402,220

* Normally Stocked Items.
‡ On Special Order Only.

In order to estimate the weight (W) of the maximum dose which may be obtained with any size filling gun, multiply the Theoretical Max. Gun Volume, (V) by the density of the product, (ρ) See Page 1. Remember that all products compact in the filling gun under vacuum, and the actual weight may be up to 20% greater than the calculated value. Consult factory for specific recommendations.

$$W = \rho V$$

$$OZ. = OZ./IN.^3 \times IN.^3$$

$$Gm. = Gm./Cm.^3 \times Cm.^3$$

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