

## A 8 b - Particle Size Distribution by Sieving with Rubber Blocks

### **GEA NIRO® Method No. A 8 b**

Revised: January 2024

#### **1. Definition**

The powder sample is divided into fractions with different particle sizes by sieving with rubber blocks.

#### **2. Scope**

The method is, to a certain extent, suitable for non-agglomerated products.

#### **3. Scope**

Powder samples are sieved together with 3 rubber blocks through a number of sieves.

#### **4. Apparatus**

1. Balance - sensitivity  $\pm 0.1$  mg.
2. Shaker for sieves, e.g. as supplied by Engelsmann, Germany(Fig.1).
3. Brush.
4. Sieves with different mesh sizes, lid and base.
5. Rubber blocks, 3 pieces for each sieve.

#### **5. Reagents**

None.

#### **6. Procedure**

1. Select the sieves, place 3 rubber blocks on each, weigh them and the base, and place them on the base in decreasing order.
2. Weigh out 50.0 g of powder and transfer it to the upper sieve.
3. Set the lid on the upper sieve and place the stack on the base of the shaker. Secure the stack and shake for 5 minutes.
4. Weigh each sieve with rubber blocks and the base with the powder. Make sure that no powder is sticking to the bottom of the sieve – brush off to lower sieve size.
5. If >20% powder is found on the upper sieve or on the base, an additional sieve with a larger or smaller mesh size is added for a new sieve analysis.

## 7. Result

The result can be found in two different ways:

1. Each fraction is indicated as a percentage of the total weight.

$$\% \text{ powder on the sieve} = \frac{a \times 100}{w} \quad \text{where}$$

a = weight of powder on the sieve

w = total weight of powder

Results are reported with 1 decimal.

Example:

% powder	sieve size, $\mu\text{m}$
0.4	>250
23.1	>212 - $\leq$ 250
30.4	>180 - $\leq$ 212
16.4	>150 - $\leq$ 180
10.2	>125 - $\leq$ 150
3.2	>90 - $\leq$ 125
1.0	$\leq$ 90

2. Accumulation of the numbers found on individual sieves:

% powder	sieve size, $\mu\text{m}$	% powder	sieve size, $\mu\text{m}$
15.7	> 250	1.0	< 90
38.8	> 212	4.2	< 125
69.2	> 180	14.2	< 150
85.6	> 150	30.8	< 180
95.8	> 125	61.2	< 212
99.0	> 90	84.3	< 250

## 8. Reproducibility

N/A

## 9. Remarks

1. Fatty and sticky products will lump together and not pass through the sieves, especially for mesh sizes  $<150\ \mu$ . To prevent this, a free-flowing agent (e.g. sodium aluminium silicate - Tix-O-Sil or Cal-Flo) can be used. Normally, 1-2% of free-flowing agent is suitable to prevent lumping on the sieves. Before sieving, gently mix the free-flowing agent with the powder in a beaker. When the correct amount of free-flowing agent is used, it will disperse evenly, so that no correction is needed when calculating the particle size distribution.

The use of free-flowing agent must be noted together with the results.

2. The particle size distribution of brittle powder will depend on the sieving time and the type of rubber blocks. If any deviation from this procedure is decided, specify it together with the results.

## 10. Literature

- GEA Niro Research Laboratory
- Allen Terence, Particle Size Measurement, 2. edition 1975 by Chapman and Hall Ltd.



Fig. 1 Shaker for sieves.