

**Standard Wet Sieving Analysis**  
**Fôrtek – Norwegian University of Life Science (UMB)**  
[www.umb.no/fortek](http://www.umb.no/fortek)

**Wet Sieving procedure on a “Retsch AS 200 Control” for feed manufactured pellets or feed compound**

**Procedure Manual**

**Subject:** Wet Sieving Analysis

*This procedure was moderately developed as an intention of standardizing the particle size analysis in feed pellets for Pellet Quality Project (PQP) that has taken place at UMB – Animal and Aquacultural department (IHA) from 2002 to 2007.*

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## 1. SCOPE (Description of Test)

This wet sieving procedure was developed in Fôrtek – Centre for Feed Technology for determining the relationship between the particle size distribution of fine and coarse aggregates in feed manufactured solids (pellets) and mixed meals.

## 2. APPARATUS (Equipment Required)

- Balance (scale) - sensitive to 0.1 g.
- Sieves – Standardized Retsch sieves for **Retsch AS 200 Control** machine.
- Mechanical sieve shaker **Retsch AS 200 Control**.
- Drying apparatus - suitable oven for drying the sample on 104C (EU 71/393).

## 3. PROCEDURE (Sample Preparation)

Obtain a representative feed pellets sample that will be tested (min. 300 grams). Dry-sieve the sample in order to reduce all particles that are not in pellet form (dust and crumbles).

Recommended sieve size for different pellet diameter for dry pre-sieving:

Pellet diameter (mm)	Estimated tolerance* for selecting size of sieve (mm)
1,0	0,8 </= <b>XX</b> </= 0,9
1,5	1,2 </= <b>XX</b> </= 1,4
2,0	1,6 </= <b>XX</b> </= 1,8
2,5	2,0 </= <b>XX</b> </= 2,3
3,0	2,4 </= <b>XX</b> </= 2,7
3,5	2,8 </= <b>XX</b> </= 3,2
4,0	3,2 </= <b>XX</b> </= 3,6
4,5	3,6 </= <b>XX</b> </= 4,1
5,0	4,0 </= <b>XX</b> </= 4,5
5,5	4,4 </= <b>XX</b> </= 5,0
6,0	4,8 </= <b>XX</b> </= 5,4
6,5	5,2 </= <b>XX</b> </= 5,9
7,0	5,6 </= <b>XX</b> </= 6,3
7,5	6,0 </= <b>XX</b> </= 6,8
8,0	6,4 </= <b>XX</b> </= 7,2
8,5	6,8 </= <b>XX</b> </= 7,7
9,0	7,2 </= <b>XX</b> </= 8,1
9,5	7,6 </= <b>XX</b> </= 8,6
10,0	8,0 </= <b>XX</b> </= 9,0

*\*Tolerance in the table is based from ASTM-E 11-61, American Society of Testing Materials – Specification for wirecloth screens for testing purposes.*

**If the wet sieving procedure will be done on the feed mixed meal, pre-sieving should not be performed.**

## Step by step procedure:

1. Take at least two samples for moisture analysis.

*Recommended analysis: Infra-Red moisture analyzer "Sartorius". Write down the exact obtained numbers and write them down in the wet-sieving excel template (<http://www.umb.no/fortek/article/download>)*

2. Weigh out 100g of pellets (or meal, if meal should be tested).

3. Note the exact gross weight. You will use the moisture analysis results to calculate the dry weight. All percentages of sieved material are then calculated against the dry weight.

4. Soak the pellets for **2 hour** in approx. 500ml of tap water room temperature. Stir pellets at least once after the first hour for best results. The pellets must be completely dissolved before continuing the analysis.

5. Chose the sieve sizes you require. (example - 0.1, 0.2, 0.5, 1.0, 2.0mm...etc) *Standard suggested sieve sizes are: (0.2; 0.5; 1.0; 1.6; 2.0 and 2,8 mm).*

6. Remove the blue rubber sealing band from the bottom of the sieves **if it is on it**.

7. Take a tare weight (empty sieves) of all sieves that would be used. Exact weight of sieves should be recorded.

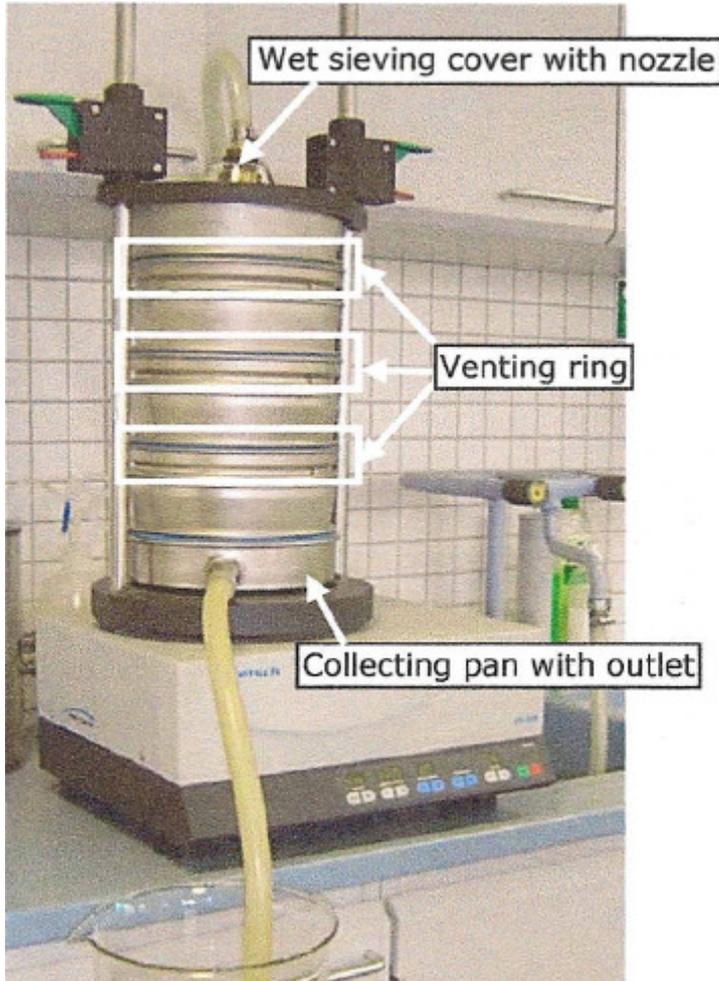
*Sieves should be washed (clean) and dry.*

8. Put the rubber-sealing band and stack the sieves in the correct order on the metal sieve with the water outlet attached.

*Smallest number of on the sieve should be at the bottom, while the highest number should be on the top.*

9. Check if nozzle on the black lid (top) is clean from calcium particles. If there are Ca<sup>+</sup> particles, please take the nozzle off the lid and place it in the beaker with formic acid for 2-3 hours. Wash the nozzle from the acid, place it back and check it again. If the water flow is even and the stream is "foggy" it means that you can continue running the analysis further.

10. Place the water outlet in a drain or sink (see photo below).



11. Pour the soaked pellets (meal) onto the top sieve. Use as much water as you need to wash all of the particles out of the container where the pellets were soaked in.

12. Close the lid with the water inlet down tightly onto the sieves (see photo below).



13. Set the amplitude suggested by **Retsch** to 1.2mm (see Retsch Wet Sieving - Official document, page 3)

14. Set the sieving time to 3 minutes.

15. Turn on the water (open the valve) and press START.

16. When the **3 minutes** sieving has finished, hold the water outlet (transparent pipe) above the top (bend it upwards) of the sieves and let the first 3 sieves (from bottom to the top) to fill-up with water (*You will see the water level in the transparent pipe*). Press START and let the sieves vibrate for **1 minute** without any water-flow (water will be inside the first 3 sieves).

17. Empty the sieves by draining all water from them.

18. Repeat steps 15, 16, and 17 twice more.

**19. To summarize: wet-sieve for 3 minutes - fill & sieve for 1 min. – wet sieve for 3 minutes - fill & sieve for 1 min. – wet sieve for 3 minutes.**

20. Remove sieves from the machine and remove the blue sealing bands from all the sieves (**do not forget to take the blue sealing bands**). Place the sieves on the top of each other in the same way as it was during the wet-sieving analysis.

21. Place the sieves on a rack in the oven at 104 C (standardized European procedure - EU 71/393), and leave it to dry-out over night.

22. When fully dried, place the “silcagel” in the oven together with the sieves and let the oven and samples in the sieves to cool down. Place each sieve with the dried material onto the scale and take a note of exact number (in grams) from the scale. Note the numbers by using our excel sheet template for “wet-sieving analysis”

([http://www.umb.no/statisk/fortek/other/wetseiving\\_form\\_with\\_calculations.xls](http://www.umb.no/statisk/fortek/other/wetseiving_form_with_calculations.xls)).

23. After weighing wash all the sieves so that no feed particles will remain.

24. By putting the numbers in our excel sheet template for the wet-sieving analysis you would be able to obtain automatically % of total dry matter in each sieve, hence the distribution of particles in the pellets.

***P.S. If numbers you have obtained are weird, check if water nozzle from the top lid is clogged by calcium and clean it. Run the same sample again!!! 😊***