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Report 3138 / Group 18

Manure Separator ROTO-SIEVE type 3024-51

Summary

Roto-Sieve, model 3024-51 is a drum sieve to be used to separate liquid manure in two phases - one liquid and one solid.

The unit was tested with manure from pigs and cattle. It performed satisfactorily during the test period.

The unseparated pig manure had a dry substance content of appr 9 %. After separation the dry substance content was appr 4.5 % for the liquid phase and appr 14 % for the solid phase. Operating the drum at its max rotational speed the max capacity was appr 15 ton of unseparated manure per hour. The drum was initially operated with a variable speed motor. This was later exchanged for a motor with a fixed speed.

Two different lots of unseparated cattle manure had a dry substance content of 8 % resp 4 %. The max capacity with unseparated high dry substance content manure was measured to 28.5 tons per hour. The measured max capacity with unseparated low dry substance content manure was measured to 27.1 tons per hour. The max possible capacity with low dry substance content manure could not be measured.

After separation the dry substance content of the solid part was 11 % for both the 8% and the 4% lots.

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Description

Roto-Sieve model 3024-51 is a drum sieve to be used to separate liquid manure in two phases - one liquid and one solid.

The separator consists of a hole perforated drum with an internal transport screw, which transports the separated solids out of the drum. The diameter of the holes where in this case 2.0mm.

The drum rotates on permanently lubricated trunnion wheels. The drive unit consists of a motor, a gear box, a pinion drive and a cog wheel.

The unseparated fluid is fed into the drum by an inlet pipe which distributes the liquid to the inside of the drum. The sieved liquid passes the drum hole openings and is collected in a trough under the drum. Remaining in the drum are the solids which are being transported out of the drum to the discharge hopper.

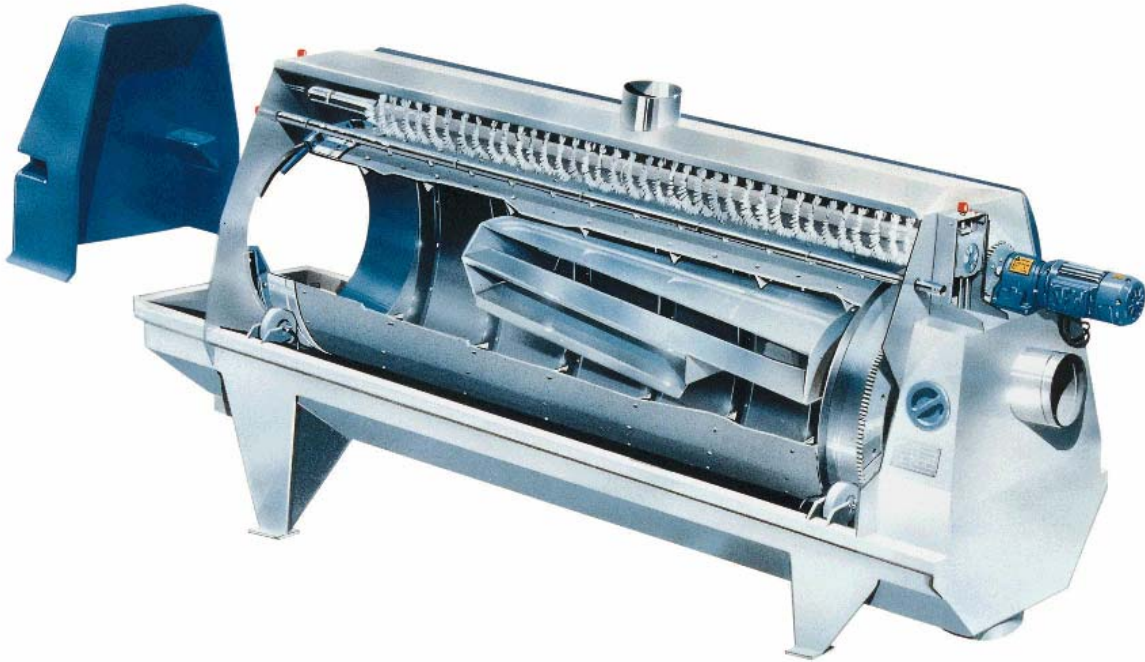
The separator consists of an over flow system, which protects the function of the sieve.

In order to prevent clogging of the perforated area the drum sieve is provided with a rotating brush and a spraying pipe with nozzles.

The drum sieve is mainly made out of stainless steel with plastic covers.

Technical specification

Height:	1.44 m
Length	2.76 m
Width	0.89 m
Length of screen drum	2.06 m
Circumference of drum	1.90 m
Size of hole perforation	2.0 mm
Weight	280 kg
Peripheral speed of drum	25 rpm
Power of drive motor	0.55 kW



Test results

The manure separator was tested during 1987 in two Swedish locations using liquid manure from pigs and cattle. The results are shown in table 1. Each test was made at least 3 times. the manure flow varied. Biggest possible flow was set at over flow. The capacity and the amount of dry substance can be very different from place to place.

Table 1. Capacity at a variety of amount of flow from pig and cattle manure. The amount of dry substance before and after separation.

Type of manure	Unseparated amount of manure kg/h	Amount of dry substance (DS), %			Drum rotations rpm
		Unseparated	Separated		
			Liquid	Solids	
Pig manure	7.700	8,4	4,2	14,1	10
little amount of straw	6.800	8,8	4,6	14,6	17
High amount of DS	9.000	8,8	4,2	13,9	25
	14.800	8,9	4,3	12	25
Cattle manure	5.000	7,5	4,9	10,8	25
High amount of DS	7.000	7,9	5,2	10,8	25
	16.100	7,7	4,3	11	25
	24.700	7,5	4,9	10,8	25
	28.500	7,4	4,4	10,2	25
	Cattle manure	6.200	3,9	3,2	11,6
Low amount of DS	27.100	3,6	3,1	9,5	25

Table 2. Example of organic matter in unseparated and separated manure.

		Unseparated	Separated	
			Liquid	Solid
Dry substance, DS	%	8,1	4,9	15
Ashes	%	1,2	1,1	1,4
Nitrogen, N	kg/ton	2,1	2,1	2,3
Ammonium nitrogen, NH ₄ -N	kg/ton	0,9	1	0,8
Phosphorous, P	kg/ton	0,5	0,5	0,6
Potassium, K	kg/ton	1,8	1,8	1,8