The authors are grateful to the Reviewer for the valuable comments and positive assessment of the article. All comments of the Reviewer are taken into account in the new version of the article.

All corrections were filled by yellow color.

Detailed answers to all Reviewers' comments

*1. “In general, this manuscript is correctly structured, however, English language have to be checked and improved”.*

English language was checked and improved.

*2. “Introduction should be expanded with more detailed literature review”.*

New references were added.

1. Urea Casale S.A. [E-text type]. Location of document: <http://www.casale.ch/>.
2. Kahl Group [E-text type]. Location of document: <http://www.amandus-kahl-group.de>.
3. Stamicarbon [E-text type]. Location of document: http://www.stamicarbon.ru.
4. Toyo Engineering Corporation [E-text type]. Location of document: <http://www.toyo-eng.com>.
5. Glatt Innovative Technologies for Granules and Pellets [[E-text type]. Location of document: <http://www.glatt.com>.

1. Sklabinskyi VI, Skydanenko MS., Kononenko NP. Technical audit of melt granulation knots in the production of mineral fertilizers using tower method. *Tech Aud Prod Res.* 2014; 3(2): 16−23.
2. Norsk Hydro [E-text type]. Location of document: https://www.hydro.com/en
3. Wu Y, Bao C, Zhou Y. An Innovated Tower-fluidized Bed Prilling Process. *Chin J Chem. Eng*. 2007; 15: 424–428.
4. Saleh SN, Ahmed SM, Al-mosuli D, Barghi S. Basic design methodology for a prilling tower. *Can J Chem Eng.* 2015; 93: 1403–1409.

Literature review was extended.

“For example, the ammonium nitrate granulators (dispersers), which are currently in operation, let to produce products with the following properties by the granulometric composition: mass fraction of the granules with the size less than 1.0 mm – 0.5-1.5%, mass fraction of the granules with the size 2.0-4.0 mm – 90-98%, therefore the mass fraction of the granules with the size 2.0-2.5 мм – 42-71%, and the content of granules with size 2.0-3.0 mm – 85-95% [13, 14]. The dispersion of the melt with obtaining more than 2% of dust-forming particles of less than 1.0 mm and over 3.5 mm, which can be also destructed making dust, leads to the presence of the nitrogenous fertilizers dust in the air of the tower.

*3. “It is recommended to expand results and discussion section. Compare with
other researchers’ findings”.*

Results and discussion part was extended.

“Investigations showed that the vibrating granulator installation let to:

- change the diameter of the spray cone from 3 m to 7 m;

- reduce the probability of collision of the melt drops after flowing out of holes by increasing the pitch between the holes;

- decrease the level (pressure) of the melt in the granulator, reduce its outflow velocity and thermal load on the tower.

The vibrating granulators have a reliable vibration system, which provides a stable imposition of oscillations on the fluid jets, flowing out of the perforated shell holes, regardless the changes in the load on the melt disperser. This vibration system lets to measure the level of melt in the granulator and thereby, to control the clogging degree and the melt outflow velocity from the holes of the perforated shell.

The vibrating granulator with electromagnetic vibration system provided the production of a product with the following granulometric composition: the fraction of granules of less than 1.0 mm – 0.02-0.2%, fraction of granules of 2.0-4.0 mm – over 96%, therefore, for granules of the fraction 2.0-2.5 mm – not less than 88%, the size of the main fraction granules – 2.1-2.5 mm. When the vibration frequency was changed, the disperser provided the production of the product with the main fraction of granules of 2.5-3.0 mm over 65% simultaneously increasing the hardness of the main fraction granules.

The similar results on the granulometric composition of the product were obtained on the vibrating granulators with electromagnetic vibration system in the ammonium nitrate production in tropical conditions in Cuba and urea with foaming additives of hydrohumates. During the industrial operation of this device the product of the following granulometric composition (mass fractions through the example of urea) was stably obtained during the month: granules with a size of less than 1.0 mm - 0.1-0.3%, granules with a size of 1.0-4.0 mm - 99.7-99.9%; granules with a size of 2.0-4.0 mm - 96.5-98.9%; granules with a size of more than 4.0 mm are absent.”

*4. “It is important to include a short discussion on the reliability of the
results and model reported herein”.*

The methods of mathematical statistics and procedure according the reliability of the results and model were added.

“The methods of mathematical statistics to define the optimal number of experiments and the highest accuracy degree and reliability of the obtained results, as well as the processing of these results, was used [23].

Two types of measurement errors - random and systematic may occur during the experiment conducting [24].

A random error reduces the accuracy of experiment results. An analysis of this type of error is possible by using the root-mean-square deviation σ, calculated by the following equation

 (7)

where  – the arithmetic mean value; x – the single parameter value; n – the number of measurements.

The maximum possible error of a separate measurement was determined by three sigma rule

 . (8)

The bilateral confidence interval of the arithmetic mean value ε was determined by the dependence [24], providing that this parameter is located in the confidence interval with probability not less than 95%

 (9)

where t – Student’s criterion [25].

The root-mean-square error of indirect measurements

 , (10)

where y=f(x1,x2,…xn).

The accuracy of the obtained regression equations is determined by the least-squares method [24].

The systematic measurement error had an identical effect on all parameters that were controlled during the experiment. All measurement devices were tared by calibration instrument by comparing their accuracy with declared in the technical documentation for excluding of the above error. The connection between measurement devices and devices on the control panel was provided with a maximum error of processing signals within 1.5%.

The creation of graphical dependences was carried out by differential methods of mathematical analysis and integral calculus. The reliability of the obtained experimental results is caused by the application of time-tested methods in practice.”

5. “A better explanation of Figures 6-8 should be given”.

Additional explanation of Figures 6-8 was added.

“Analysis of fig. 6-8 lets to confirm that there is an optimal (operating) frequency (frequency range) of the vibration, at which the maximum degree of the drops monodispersity is achieved. Therefore, the melt jet disintegrates evenly and without the formation of drops satellites.

The monodispersion process introduces a fundamental improvement in the technology to produce fertilizers. The use of the uniform (monodisperse) granules, for example in the agriculture, lets evenly to distribute the fertilizers on the fertilized area and due to this to obtain the additional yield up to 10%.

Vibrating granulators let to produce strong monodisperse granules with a smooth glossy surface (the monodispersity degree is up to 99 %). It defines the possibility to intensify the granulation process and essentially improves the agrotechnical value of fertilizers.”

6. “The quality of the Figures (including legends and axes labeling) are not
quite satisfactory. The quality Figures should be better”.
Figures with poor duality were corrected. New version of these figures was uploaded.

7. “Figures 1 and 2 lack the appropriate symbols and units on the x and y
axes”.

Figures 1 and 2 was corrected.

8. Row 159: put literature citation in proper form.

Reference was corrected.

9. Row 209: unclear sentence.

Sentence was corrected.

“The coefficient  is defined, assuming that at a point close to the origin of the coordinate system , the exhaust velocity has not yet changed its value and is equal to the flow velocity jet in the hole .”

10. “Table 1 as well as its explanation should be moved from the conclusions to
the discussion section”.
Table 1 was replaced to the discussion section.

11. “It is recommended to add a list of symbols at the end of the manuscript,
because some symbols are not well explained or not explained at all through
text”.

List of symbols was added at the end of manuscript.

**“Symbols**

Gτ – the amount of melt, m3;

 – bigger and smaller diameter of drops, m (mm)

f1, f2 – upper and lower limits of frequency, 1/s;

favi – average frequency of vibration, which provides monodisperse jets decay, 1/s;

υθ υr, υz – tangential, radial and axial components of jet velocity respectively, m/s;

r – radius of the jet, m;

p – the outflow of jet pressure, Pa;

ρ – fluid density, kg/m3;

τ – an experimental time of melt outflow through the granulator hole, s.”