IJIRSET
International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

e-ISSN: 2319-8753 | p-ISSN: 2347-6710

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 10, Issue 11, November 2021

ISSN INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 7.569

9940 572 462 | 6381 907 438 | ijirset@gmail.com | www.ijirset.com

| e-ISSN: 2319-8753, p-ISSN: 2347-6710| www.ijirset.com | Impact Factor: 7.569|

|| Volume 10, Issue 11, November 2021 ||

| DOI:10.15680/IJIRSET.2021.1011040|

Change of Cotton Fiber and Change of the Mass Share of Dirty Mixtures

Toyirova Tursunoy Abdugapirovna, Kulmetov Mirpolat, Yuldasheva Mavluda Turamuratovna, Akhmedova Mokhinur Fayzullo qizi, Rizayev Farrux Farxod o'g'li

Tashkent Institute of Textile and Light Industry (Uzbekistan)

Tashkent Institute of Textile and Light Industry (Uzbekistan)

Jizzakh Polytechnic Institute (Uzbekistan)

Tashkent Institute of Textile and Light Industry (Uzbekistan)

Tashkent Institute of Textile and Light Industry (Uzbekistan)

ABSTRACT: this article analyzes the mass fraction of defects and impurities in the fibers of medium-fiber cotton varieties grown in JSC "Cotton Industry Scientific Center" in 2019 on FM and AX analyzers and analyzes the changes in the mass fraction of deficiencies and impurities of cotton fiber.

KEYWORDS: the mass fraction of defects and contaminants in the sample, the amount of defects and wastes in the cotton fiber, i.e. the tangled, complex tangled fiber and the crushed or injured seeds

I.INTRODUCTION

In world practice, cotton fiber is the main raw material for the textile industry. According to the International Cotton Advisory Committee (ICAC), 23 million people have died worldwide in recent years. tons of cotton fiber is produced, and the demand for it is currently 24.6 million tons. Demand for cotton fiber is expected to increase in the future due to intensive population growth. In the leading developed countries for the supply of cotton fiber, such as the United States, China, India, Turkey, great attention is paid to the modernization of technological process control methods, the development of automated techniques and technology design methods and the development of automated cotton processing systems. In this regard, the production of resource-saving techniques and technologies of fiber cleaning, which improve the quality of the product, is also an important task. The world is focused on the development of fiber cleaning techniques and technology as the main technological process of primary processing of cotton. Therefore, the modernization of the fiber cleaning process, which is one of the main means of ginning enterprises, the development of mathematical models that optimize the tasks of improving the quality of the obtained fiber is of great importance.

One of the main properties of cotton fiber is the amount of defects and waste in its composition. The price and grades of cotton fiber are evaluated according to the level of impurities. Cotton fiber is divided into high, good, medium, normal and dirty classes according to the standard pollution level. The lower the impurity class of the fiber, the lower its price.

The increase or decrease in the amount of contaminants and defects in the cotton fiber in ginneries depends on a number of factors, ie during the ginning period, the volume of contamination in the lower part of the gin and the amount of minor defects increases. The amount of small defects increases and the amount of large defects decreases. As a result, cleaning from minor defects leads to a decrease in efficiency.

The high moisture content of cotton fiber accepted in ginneries leads to an increase in the amount of defects and waste. If the moisture content of cotton received in ginneries is higher than the standard values, during the processing of it, the amount of impurities in the fiber, the amount of impurities, the amount of impurities, the amount of hull fiber, beaten or injured seeds decreases. In addition, the higher the temperature at which the cotton is dried and undergoes many technological processes, the better it is cleaned of contaminants, which leads to an increase in the amount of some beaten or injured seeds, tangled and complex tangled fiber, bark fiber.

As a result of drying cotton at high temperatures and low humidity, the cleaning efficiency of seed cotton is high. If the moisture content during the drying of the seed cotton is higher than the standard values, the cleaning efficiency will decrease. In addition, the amount of pollution is reduced due to repeated cleaning of seed cotton in

| e-ISSN: 2319-8753, p-ISSN: 2347-6710| www.ijirset.com | Impact Factor: 7.569|

|| Volume 10, Issue 11, November 2021 ||

| DOI:10.15680/IJIRSET.2021.1011040|

ginneries. At the same time, if we carry out repeated cleaning of seed cotton, the amount of defects and waste in the cotton fiber will increase, ie due to the increase in the amount of tangled, complex tangled fiber and beaten or injured seeds. In addition, the seeds that are hit or injured during the separation of the fiber from the seed, the amount of bark fiber increases.

II. METHODOLOGY

Moisture content plays a very important role in cotton ginning plants. If the moisture content of the seed cotton is high, the amount of fiber content and waste will increase.

According to the state standard, cotton fiber is divided into a number of classes, ie high, good, medium, dirty and bad, depending on the amount of pollution, and the price varies according to these classes.

Research has been conducted to determine the mass fraction of defects and impurities in the composition of cotton fiber. The test results obtained are presented in Tables 1 and 2 below.

Table 1
Test results on the FM-30 analyzerstatistics

№	Type I State Standard Samples		Type II State Standard Samples	
	the mass fraction of defects and contaminants in the i-sample, $\%\Pi_i$	$(\Pi_i - \overline{\Pi}_{\text{I}})^2$	*i* the mass fraction of defects and contaminants in the i-sample, $\%\Pi_i$	$(\Pi_i - \overline{\Pi}_{\text{II}})^2$
1	2,49	0,0426	4,18	0,0028
2	2,60	0,0093	4,28	0,0022
3	2,45	0,0607	4,30	0,0045
4	2,49	0,0426	3,93	0,0919
5	2,63	0,0044	3,89	0,1178
6	2,77	0,0054	4,15	0,0069
7	2,74	0,0019	5,09	0,7342
8	2,84	0,0206	3,66	0,3285
9	2,88	0,0337	4,61	0,1420
10	2,85	0,0236	3,91	0,1044
11	2,35	0,1199	4,28	0,0022
12	2,90	0,0415	4,10	0,0177
13	2,80	0,0108	4,15	0,0069
14	2,77	0,0054	4,18	0,0028
15	2,69	0	5,01	0,6035
16	2,94	0,0594	4,56	0,1068
17	2,83	0,0179	4,30	0,0045
18	2,38	0,1001	3,89	0,1178
19	2,83	0,0179	3,96	0,0746

Table2
The results of tests performed on the AX analyzerstatistics

№	Type I State Standard Samples		Type II State Standard Samples	
	the mass fraction of defects and contaminants in the i-sample, $\%\Pi_i$	$(\Pi_i - \overline{\Pi}_{\text{I}})^2$	the mass fraction of defects and contaminants in the i-sample, $\%\Pi_i$	$(\Pi_i - \overline{\Pi}_{\text{II}})^2$
1	2,51	0,0346	4,24	0,0003
2	2,59	0,0112	4,29	0,0032
3	2,55	0,0213	4,3	0,0045
4	2,5	0,0384	3,93	0,0918
5	2,61	0,0074	3,89	0,1176
6	2,76	0,0041	4,15	0,0069
7	2,7	0,0000	5,09	0,7344
8	2,83	0,0180	3,66	0,3283
9	2,85	0,0237	4,61	0,1421

| e-ISSN: 2319-8753, p-ISSN: 2347-6710| www.ijirset.com | Impact Factor: 7.569|

|| Volume 10, Issue 11, November 2021 ||

| DOI:10.15680/IJIRSET.2021.1011040|

10	2,8	0,0108	3,91	0,1043
11	2,51	0,0346	4,28	0,0022
12	2,87	0,0303	4,1	0,0177
13	2,65	0,0021	4,15	0,0069
14	2,75	0,0029	4,18	0,0028
15	2,72	0,0006	5,01	0,6037
16	2,9	0,0416	4,56	0,1069
17	2,8	0,0108	4,3	0,0045
18	2,45	0,0605	3,89	0,1176
19	2,77	0,0055	3,96	0,0745

Based on the results in the table, Figures 1 and 2 show the change in the mass fraction of defects and contaminants in the State Standard Samples of Types I and II.

III. RESULTS AND DISCUSSION

The arithmetic mean of the test results on the FM-30 cotton analyzer is Type I State Standard Samples = 2,696, Type II State Standard Samples = 4,233.

The arithmetic mean of the test results on the AX cotton analyzer is Type I State Standard Samples = 2,691, Type II State Standard Samples = 4,237.

Comparing the results of the tests performed on the cotton analyzer AX and FM-30, it was found that the difference in the arithmetic mean is equal to the State Standard Samples of Type I = 0.005, State Standard Samples of Type II = 0.004.

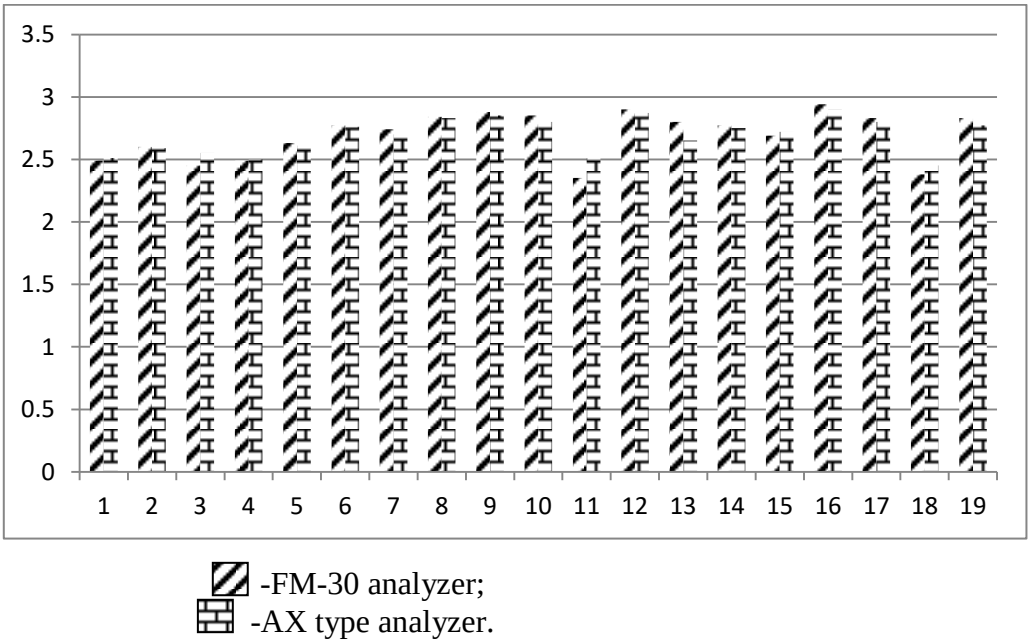

Figure 1. Results of determination of mass fraction of defects and contaminants in FM-30 and AX analyzers of type I State standard samples.

| e-ISSN: 2319-8753, p-ISSN: 2347-6710| www.ijirset.com | Impact Factor: 7.569|

|| Volume 10, Issue 11, November 2021 ||

| DOI:10.15680/IJIRSET.2021.1011040|

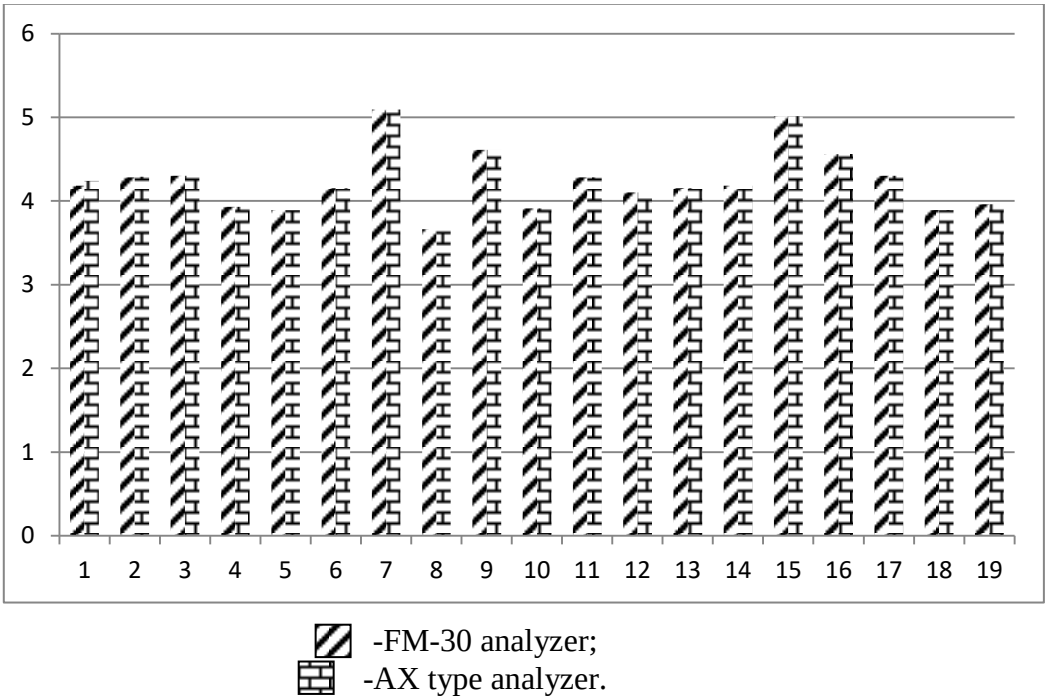

Figure 2. Results of determination of the mass fraction of defects and contaminants in the State Standard samples of type II in FM-30 and AX analyzers.

The arithmetic mean value of the mass fraction of defects and contaminants for type I of state standard samples was 2.696%, for type II of state standard samples 4.233%.

The standard deviation was determined by the following formula $\sigma(\dot{\Delta})$:

$$\sigma(\dot{\Delta}) = \sqrt{\frac{\sum_{i=1}^{i=N}(\Pi_i - \overline{\Pi})^2}{J-1}} \quad (3)$$

hereΠ_i- the mass fraction of defects and impurities, each i is the determined value %; $\overline{\Pi}$ -the average value of the mass fraction of defects and contaminants,%.

Then, for type I of the State standard samples, $\sigma(\dot{\Delta})$ I = 0.185; For type II of the state standard samples, $\sigma(\dot{\Delta})_{II}$ II = 0.371.

Thus, the ratio of θ is = 1.08 for both State Standard Sample Types

In accordance with RD 51-017, 15 samples were tested in J = 6 parallel iterations.

Tests for the study of the uniformity of the mass fraction of defects and contaminants of state standard samples of cotton fiber of I and II types were carried out in accordance with the requirements of UzDSt 632: 2014.

Test results for determining the mass fraction of defects and contaminants of the State Standard samples of types I and II are given in Tables 2 - 3.

The determination of the homogeneous characteristics of the state standard samples was carried out in accordance with the calculation algorithm given below.

The mean standard squared deviation SSe of the test results within the sample is calculated according to the following formula:

| e-ISSN: 2319-8753, p-ISSN: 2347-6710| www.ijirset.com | Impact Factor: 7.569|

|| Volume 10, Issue 11, November 2021 ||

| DOI:10.15680/IJIRSET.2021.1011040|

$$SS_e = \sum_{n=1}^{N} \sum_{j=1}^{J} (x_{nj} - \bar{x}_n)^2 \quad (4)$$

The mean standard standard deviation SSn between samples is calculated according to the following formula:

$$SS_n = J \sum_{n=1}^{N} (\bar{x}_n - \bar{x})^2 \quad (5)$$

here, $\bar{x}_n$ -the arithmetic mean of the J results of the sample; $\bar{x}$ - the arithmetic mean of all NJ results.

The standard deviation of the samples is.

The similarity of the mass fraction of defects and contaminants of the State standard samples of type I was studied, the results are given in Tables 3-4.

Table 3

Defectiveness and uniformity of the mass fraction of contaminants of the State standard samples of type I in the analyzer FM-30

№	Number of returns						$\bar{X}_{nj}$,%	$\bar{X}_n$,%
	1	2	3	4	5	6		
1	2,85	2,83	2,84	2,85	2,84	2,85	2,84	
2	2,98	2,88	2,89	2,97	2,91	2,93	2,93	
3	2,86	2,9	2,88	2,88	2,89	2,89	2,88	
4	2,9	2,94	2,92	2,93	2,92	2,92	2,92	
5	2,94	2,99	2,97	2,98	2,98	2,97	2,97	
6	2,94	2,99	2,97	2,98	2,98	2,97	2,97	
7	2,85	2,85	2,85	2,92	2,93	2,88	2,88	
8	2,84	3,02	2,93	2,93	2,92	2,92	2,93	2,95
9	2,98	3,01	2,97	2,95	3,01	2,98	2,98	
10	2,98	3,01	2,99	2,98	3,02	2,96	2,99	
11	3,04	2,97	3,02	2,98	2,98	2,99	3,00	
12	2,94	2,96	2,99	2,96	3,01	2,99	2,98	
13	3,07	2,99	3,03	3,05	3,04	3,04	3,04	
14	2,99	2,98	2,98	2,99	2,97	2,98	2,98	
15	2,91	2,92	2,91	2,92	2,91	2,91	2,91	

Table 4

Defects and homogeneity of the mass fraction of impurities in the AX analyzer of the State standard samples of type I

№	Number of returns						$\bar{X}_{nj}$,%	$\bar{X}_n$,%
	1	2	3	4	5	6		
1	2,84	2,85	2,84	2,86	2,85	2,87	2,85	
2	2,99	2,87	2,88	2,95	2,92	2,91	2,92	
3	2,97	2,8	2,86	2,87	2,86	2,87	2,87	
4	3	2,96	2,9	2,95	2,93	2,95	2,95	
5	2,96	2,98	2,97	2,99	2,97	2,98	2,98	
6	2,97	2,98	2,99	2,96	2,99	2,98	2,98	2,94
7	2,84	2,84	2,85	2,87	2,91	2,89	2,87	
8	2,85	3	2,9	2,92	2,91	2,91	2,92	
9	2,83	2,85	2,84	2,86	2,85	2,87	2,85	
10	2,98	2,98	2,99	2,95	3	2,94	2,97	
11	3,01	2,96	3,1	2,97	2,97	2,98	3,00	
12	2,96	2,99	3,2	3,01	3,01	3,02	3,03	
13	3,02	3,03	2,99	3,02	3,01	3,02	3,02	

| e-ISSN: 2319-8753, p-ISSN: 2347-6710| www.ijirset.com | Impact Factor: 7.569|

|| Volume 10, Issue 11, November 2021 ||

| DOI:10.15680/IJIRSET.2021.1011040|

14	2,98	2,99	2,99	3	2,99	2,99	2,99	
15	2,95	2,92	2,91	2,93	2,94	2,91	2,93	

Table 5

Defects and homogeneity of the mass fraction of impurities in the FM-30 analyzer of the State standard samples of type II

№	Number of returns						$\overline{X}_{nj}$, %	$\overline{X}_{n}$, %
	1	2	3	4	5	6		
1	4,21	4,21	4,23	4,23	4,21	4,21	4,22	
2	4,23	4,25	4,25	4,24	4,25	4,24	4,24	
3	4,34	4,36	4,34	4,36	4,36	4,36	4,35	
4	4,38	4,38	4,37	4,36	4,34	4,36	4,38	
5	4,23	4,26	4,24	4,24	4,25	4,24	4,24	
6	4,48	4,47	4,44	4,45	4,47	4,47	4,46	
7	4,44	4,45	4,42	4,44	4,44	4,44	4,44	
8	4,44	4,45	4,46	4,45	4,46	4,46	4,45	4,36
9	4,42	4,42	4,44	4,42	4,43	4,42	4,43	
10	4,44	4,45	4,38	4,38	4,42	4,45	4,42	
11	4,52	4,54	4,52	5,52	4,52	4,54	4,53	
12	4,23	4,24	4,23	4,23	4,23	4,24	4,23	
13	4,25	4,25	4,38	4,25	4,36	4,26	4,29	
14	4,38	4,38	4,42	4,45	4,38	4,38	4,40	
15	4,23	4,24	4,26	4,26	4,26	4,24	4,25	

Table 6

Defects and mass uniformity of contaminants of type II State standard samples in AX analyzer

№	Number of returns						$\overline{X}_{nj}$, %	$\overline{X}_{n}$, %
	1	2	3	4	5	6		
1	4,2	4,21	4,23	4,23	4,2	4,2	4,21	
2	4,33	4,3	4,29	4,32	4,31	4,32	4,31	
3	4,33	4,35	4,33	4,35	4,35	4,35	4,34	
4	4,37	4,37	4,37	4,35	4,34	4,36	4,36	
5	4,22	4,25	4,25	4,23	4,24	4,24	4,24	
6	4,47	4,48	4,43	4,44	4,46	4,46	4,46	
7	4,45	4,46	4,44	4,45	4,44	4,45	4,45	
8	4,45	4,46	4,47	4,46	4,47	4,47	4,46	4,38
9	4,44	4,47	4,45	4,43	4,45	4,44	4,45	
10	4,46	4,46	4,4	4,4	4,43	4,47	4,44	
11	4,52	4,54	4,52	5,52	4,52	4,54	4,69	
12	4,25	4,26	4,25	4,25	4,25	4,26	4,25	
13	4,27	4,26	4,4	4,27	4,38	4,3	4,31	
14	4,4	4,42	4,43	4,45	4,47	4,47	4,44	
15	4,28	4,3	4,31	4,3	4,27	4,28	4,29	

The averages of the standard samples taken in the analyzers of different models for the uniformity of the mass fraction of defects and impurities are given in Figure 3 below.

| e-ISSN: 2319-8753, p-ISSN: 2347-6710| www.ijirset.com | Impact Factor: 7.569|

|| Volume 10, Issue 11, November 2021 ||

| DOI:10.15680/IJIRSET.2021.1011040|

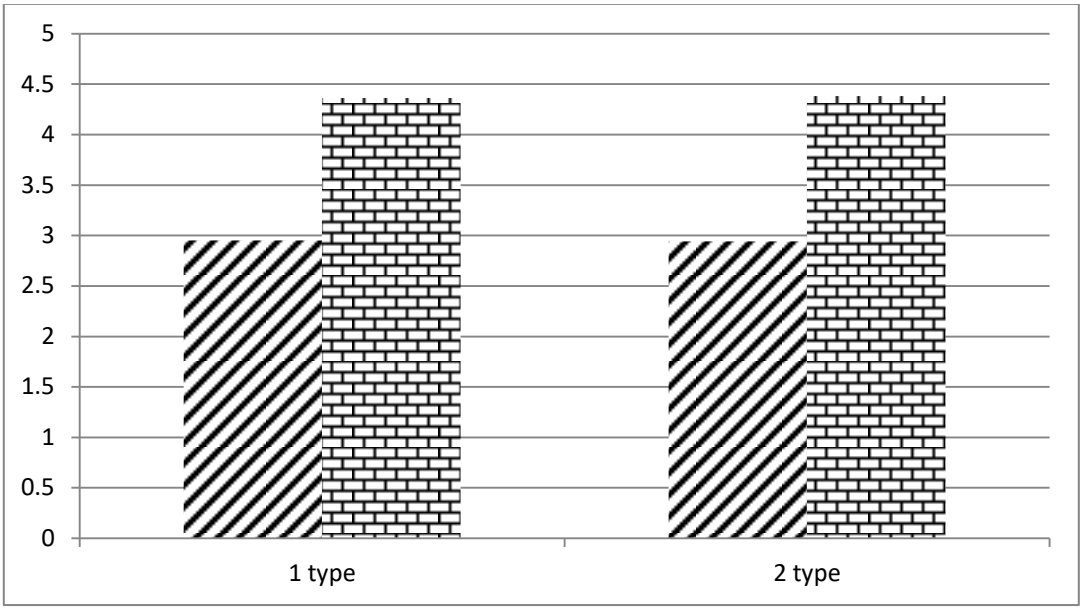

Figure 3. Variation of averages of standard samples taken in different types of analyzers on the uniformity of the mass fraction of defects and impurities.

Results within the sample SS_e

$$\overline{SS}_e = \frac{SS_e}{N(J-1)} \quad , \tag{6}$$

and sampled $\overline{SS}_H$

$$\overline{SS}_H = \frac{SS_H}{N-1} \text{ га тенг.} \tag{7}$$

The homogeneity characteristic is determined by the following formula:

$$\sigma_H = \sqrt{\frac{1}{J}(\overline{SS}_H - \overline{SS}_e)} \quad , \tag{8}$$

агар $\overline{SS}_H \le \overline{SS}_e$ бўлганда, $\sigma_H = \frac{1}{3}\sqrt{\overline{SS}_e}$ га тенг бўлади. (9)

Research was conducted to study the uniformity of state standard samples in terms of defect and mass fraction of contaminants. For this, the sum of the square deviations of the State Standard samples of Type I and Type II, the sum of the square deviations of the test result between the samples, the mean deviation of each sample, the mean deviation between the samples and the homogeneous characteristics were determined. The statistical data of the obtained test results are given in Table 7.

Table 7

The amount of deviation of the state standard samples on the uniformity of the mass fraction of defects and contaminants

Type of state standard samples	I	II
The sum of the quadratic deviations of the test result within the samples SS_e	0,0619	0,0347
The sum of the square deviations of the test result between the samples SS_n	0,2326	0,8609
The standard deviation of each sample $\overline{SS}_e$	0,0008	0,0005

| e-ISSN: 2319-8753, p-ISSN: 2347-6710| www.ijirset.com | Impact Factor: 7.569|

|| Volume 10, Issue 11, November 2021 ||

| DOI:10.15680/IJIRSET.2021.1011040|

Mean square deviation between samples $\overline{SS}_n$	0,0166	0,0615
Homogeneitycharacteristic$\sigma_{н,\ \%}$	0,05	0,10

Based on the results in Table 7, Figures 4 and 5 show the sum of the square deviations of the test result and the sum of the square deviations of the test result, the homogeneity characteristic, and the histograms of the mean square deviation between the samples.

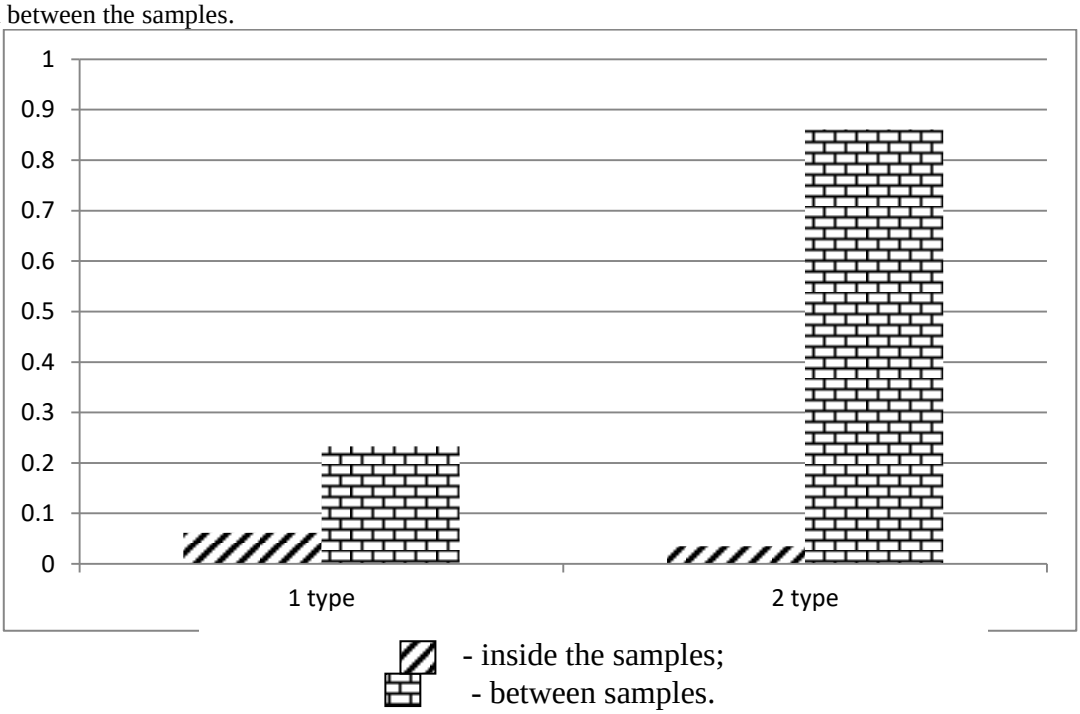

Figure 4. The change in the sum of the square deviations of the test result within the samples and the sum of the square deviations of the test result between the samples.

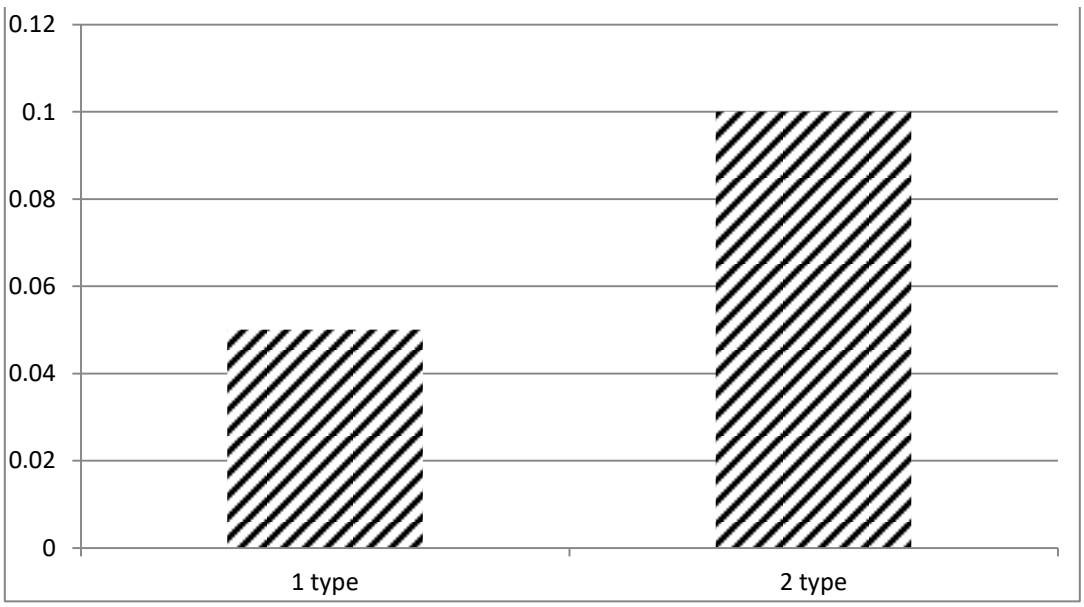

Figure 5. Changes in the homogeneity of the state standard samples in relation to the amount of deviation from the uniformity of the mass fraction of defects and impurities.

| e-ISSN: 2319-8753, p-ISSN: 2347-6710| www.ijirset.com | Impact Factor: 7.569|

|| Volume 10, Issue 11, November 2021 ||

| DOI:10.15680/IJIRSET.2021.1011040|

According to the results of the study, the uniformity of cotton fiber for standard samples was 0.05% of the State Standard Samples of Type I and 0.1% of the State Standard Samples of Type II. The following results met the requirements of the specification and this State Standard specimens were found to be suitable for use in the calibration of cotton analyzers.

REFERENCES

1. O'zDSt 8.004: 2004 Reference materials for the composition and properties of substances and materials. Basic Provisions.
2. On the approval of the criteria for classifying technical means as measuring instruments and testing instruments. Order of the Director General of the Uzbek Agency for Standardization, Metrology and Certification, Tashkent, dated September 15, 2016, No. 550, [Registered by the Ministry of Justice of the Republic of Uzbekistan on October 3, 2016 Registration No. 2829].
3. O'zDSt 8.001: 2010 State system for ensuring the uniformity of measurements of the Republic of Uzbekistan. Ensuring the uniformity of measurements. Basic Provisions.
4. Own DSt 604: 2016 Cotton fiber. Specifications.
5. RD Uz 51-017-93 GSI RUz. Methodological guidelines for certification of reference materials of composition and properties of substances and materials.
6. Own DSt 614: 1994 Cotton fiber. Sample selection methods.
7. Own DSt 632: 2010 Cotton fiber. Methods for determining the amount of defects and contaminants.
8. Manual on primary processing of cotton JSC "Uzpakhtasanoat" and JSC "Scientific Center of Pakhtasanoat", Tashkent, 2019.

INNO SPACE
SJIF Scientific Journal Impact Factor

Impact Factor:
7.569

doi cross ref

ISSN INTERNATIONAL STANDARD SERIAL NUMBER INDIA

निस्केयर NISCAIR

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

9940 572 462 6381 907 438 ijirset@gmail.com

Scan to save the contact details