American Journal of Interdisciplinary Research and Development
ISSN Online: 2771-8948
Website: www.ajird.journalspark.org
Volume 35, December - 2024

# FIBER CLEANING PROCESS

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**Abstract**
This article provides information about fiber and its quality indicators, and also explains in detail the ways to identify defects in the fiber composition.

**Keywords**: Fiber, quality, gin, defect, seed.

## Introduction

The following requirements are imposed on fiber cleaning machines: the quality of the fiber should not be adversely affected by the working parts of the fiber cleaner; the fiber cleaner should maximally separate waste from the fiber and the resulting fibers should comply with the state standard; the amount of fiber in the waste should be minimal; fiber cleaners should have and operate devices that determine and adjust the efficiency of fiber cleaning, the amount of fiber in the waste, and other indicators. The fiber cleaner is also a continuous flow of the technological process, therefore its productivity and air flow rate should be the same as that of other machines, and in particular, in the case of a cleaner, it should correspond to the productivity of the same row of gins . After the fiber separation process, it is more effective to separate the debris and waste remaining on the surface of the fiber before the fiber is spun, since they have not yet had time to mix well with the fiber. The waste remaining in the fiber, especially after machine harvesting, is often higher than the amount specified in the standard, and this cannot be removed in this case, because it complicates the operating conditions of textile machines and makes them unusable. In addition, during the cleaning of cotton and separation of the fiber, a large number of tangles are formed in the fiber and spoil the appearance of the fiber. These tangles, in turn, increase the amount of waste generated in textile factories. As a result of many years of scientific research, both in our country and abroad, the most effective way to clean the fiber is to clean it after the carding process. The fiber is in a state of equilibrium at this time, its individual fibers are 15-20 mg in size, and its density is 0.15-0.25 kg/m3. This, in turn, leads to an increase in cleaning efficiency. Keeping the above in mind, fiber cleaners should be applied after the bleaching process. Types and theory of fiber cleaning processes. The essence of the fiber cleaning process is of great importance in the cotton ginning industry, as it affects the quality of the fiber. In order to provide the cotton ginning industry, especially the textile industry, with quality products, it is necessary to improve the fiber cleaning process. In addition, some waste (broken seeds, fiber in the seed coat, etc.) is generated during the fiber separation process, so it is necessary to quickly get rid of them.

Types of cleaning in the fiber cleaning process According to the types of fiber cleaners, fiber cleaners are divided into:
-mechanical;
-by air;
-mechanical ventilation;
By the amount of fiber cleaning - single-stage and multi-stage. By the installation of fiber cleaners - individual, designed for each gin and intended for a series of gins. By the method of passing the fiber for cleaning - after the initial compaction of the fiber (using a feeding table) and passing the fiber through the machine after the gin in a state of air formation (straight-flow). During the mechanical cleaning of cotton fiber, the chaff and unripe seeds separated from it hit the fiber ribs and as a result of the combing of the fiber, the binding of chaff and other impurities to the fiber weakens and they come out through the gaps between the ribs and the holes in the mesh. Since the efficiency is 15-20%, it is not possible to use it much. Since the air and mechanical methods used in the process of air-mechanical cleaning of cotton fiber are very effective, its use in industry has developed. The cleaning efficiency of single-stage machines of this structure is 20-30% for grades 1-II, 25-30% for grades III-V. The cleaning efficiency of the fiber cleaner can also be increased by increasing the number of stages. Theory of the process of cleaning fiber from foreign impurities Currently, cotton ginning enterprises use 3ОВПМ type or 1ВП, 2ВП type fiber cleaners to clean the fiber from impurities, the use of which depends on the type of gins. These fiber cleaners can be used with 1 cylinder or 2-3 cylinders, depending on the quality of the fiber. The overall cleaning efficiency is as follows, %:
When using 1 step: 20+25 20+23
When using 2 steps: 30+35 25+30
When using 3 steps: 35+40 30+40
The performance of fiber cleaners is determined by their cleaning efficiency, the amount of fiber removed, and the low amount of fiber in the waste.
The efficiency of fiber cleaning is determined as follows:

$$K = \frac{S_1 - S_2}{S_1 * (100 - S_2)} * 100, \%$$

this n : $S_1$ - chaff and impurities in the fiber before cleaning amount , %.
$S_2$ - the amount of impurities and impurities in the fiber after cleaning, % .
If fiber and waste are collected during the operation of the plant, the cleaning efficiency of the fiber cleaner is determined as follows:

$$K = \frac{q_{rk}(100 - B_0)}{G_1 * S_2 + q_{rk} * (100 - B_0)} * 100, \%$$

where : $q_{rk}$ - amount of separated waste, kg.
$G_1$ - amount of purified fiber, kg.
$B_o$ - fiber content of waste, %
A method for determining the cleaning efficiency of individual steps.

$$K_n = \frac{q_n * (100 - B_n)}{G_1 * S_2 + \sum_{i=n}^{m} * q_i * (100 - B_i)} \cdot 100, \%$$

this n : $q_n$ and - $q_i$ the waste being checked and separated at the nth stage

quantity, kg;

B п andB i - the variables under investigation and separated at the n-th stage

Fiber content, %

m - total number of steps of the fiber cleaner, pcs.;

n - the names of the tested stages (according to the fiber transmission)

If the cleaning efficiency of each stage is known, then the overall cleaning efficiency is determined as follows:

$$K = 100 * \left[ 1 - ((1 - \frac{K_1}{100}) * (1 - \frac{K_2}{100}) \ldots\ldots\ldots\ldots (1 - \frac{K_n}{100})) \right], \%$$

where: $K_1$, $K_2$ ... $K_n$ - cleaning efficiency of each pod, %

Waste permeability coefficient :

$$K_b = \frac{B}{100 - B};$$

The amount of waste fiber in all options should not exceed 60%. Depending on the grade of cotton and the amount of impurities, a fiber cleaning plan is drawn up. To implement the fiber cleaning plan, the average degree of impurity of the cotton group and the type of fiber are taken into account. Depending on the initial impurity of the cotton, the fiber is selected according to the amount of waste and impurities belonging to this group . Fibers obtained from the last grade cotton are processed according to the option of full implementation of the fiber cleaning plan.

the amount of waste and impurities in the fiber does not correspond to the specified parameters, then first of all it is necessary to check the size of the existing slots, the aerodynamic parameters of the fiber cleaner and adjust them.

If even then the amount of impurities and waste in the fiber does not fall to the required level, then it is necessary to check the operation of the gin, check the quality of the fiber coming out of it , and also determine the amount of impurities and waste in the cotton seed entering the gin. If even then the fiber indicator is not correct, then it is necessary to completely check and determine the operation of the cotton drying and cleaning departments.

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