

Influence of Filtration in the Final Product Stability and Quality Clarity Beer

Nexhdet Shala^{1*}, Ibrahim Hoxha¹, Gafur Xhabiri²

¹Faculty of Agribusiness, Public University "Haxhi Zeka", Eliot Engel, Pejë, Republic of Kosovo

²Faculty of Food Technology and Nutrition, University of Tetova, Ilinden str n.n., Tetovo, Republic of Macedonia

Abstract: *The purpose of the paper is to show the importance of filtration in the final product, such as stabilization, clarity and qualities of beer. In beer production the filtration process is an expensive operation.*

Beer Competition in the local market and abroad, makes the beer consumers to require high quality, good taste and flavor, proper brightness and clarity, more stable foam chemical and biological stability. These features significantly affect filtration and centrifugation operation. Filtering operation in the production of the beer leave different particles, bacteria, yeast cells, Albumins, hop substances, which affect the beer transparency. Currently system used in the factories for the process of the filtering beer brewery is Kieselguhr filter system. These filters have a common characteristic that are porous elements which are programmed one after another in vertical or horizontal position where within them create blank spaces in shape of filter-bed.

Keywords: *beer, centrifugation, filtering, clarity, stabilization.*

1. INTRODUCTION

Filtration is technological process, is separation of the solid phase of the suspension. Beer nowadays is made on four steps: malting, wort production, fermentation, and filtration step [1], [14]. After fermentation process beer is blurred contain various suspended particles yeast cells, preparations of protein, coagulation matter, resins hops etc., which ruin the taste and should be removed.[17], [20].

The fundamental method of the paper is to illustrate that to grow transparency of the beer is making artificial clarity. Clarity Main processes are: filtration and centrifugation. Making data difficult filtration the beer is saturated with carbon dioxide, which does not get lost during the filtration process [15], [9]. For this reason, the process of filtration pressure becomes higher than the pressure that has acted in a basement in the arrival phase. System which is used in Peja

Brewery for beer filtration is Kieselguhr filter (kieselguhr is device for filtration, produced by diatomic layers of algae, its chemical composition contain dioxide silicon carbide and aluminum oxide) [19], [13]. Beer filter contain vertical cylindrical vessel with conical bottom. The interior part of the filter is divided into two pieces a plate with holes, attached to the filter rods located at the bottom of the filter. Filtration operation leave different particles, as bacteria, yeast cells, protein, resins hops, which affect transparency of the beer [18], [22]. Filtration process starts with the preparation of kieselguhr suspension, which serves to sieve garment fabricated filter layer elements. Inside part of the filter is enclosed with filter sticks, and filter rods have a large number of rings listed in a shaft, which serves as a carrier of pipe solution. Rings have small area, on the one side have smaller roughness on the other side have significantly greater roughness, so when range one above the other, lies at a distance of 50-90 microns [2]. The filter is located in a ward constitutes dosage basin, pumps and tools for regulating and monitoring the filtration process. Filter layer from kieselguhr is porous, divides dirt particles up to a size of 0.1 micron. Filter rod used for beer, filtration is located inside the filter. Is composed by a large number rings listed in the shaft. Axis on both sides of the slags. Holes are used for the passage of the filtered beer at the top of the filter [11], [8]. Rings have small area, on the one side have little roughness, and on the other side have significantly greater roughness. Unfiltered beers come through the entire surface of the filter element, which enclosed from kieselguhr. Filter rod is composed with: amplification filters holes, filter rings booster rings, dado.

2. MATERIALS AND METHODS

For implementing of beer filtering operations is used Candle Precoat Filter. For this ancillary operation are used filtering materials: Kieselguhr (D.E.), perlite, cellulose, redeemable polymers. Kieselguhr filters aid material is important for filtering beer process [16], [23].

For producing kieselguhr is used natural products that are obtained from poultry bones waste, aquatic plants, shells of diatom a. Diatom a particles have different shape and structure are strong and largest amount consists of silicate acid [3].

Filter is consists from vertical cylindrical vessel with conical bottom. The interior of the filter is divided into two parts by a plate with holes, which are attached 375 filter rods that are placed at the bottom of the filter.

Filter layer formed kieselguhr is porous, divides dirt particles up to a size of 0.1 micron [4], [5]. During the dressing of rods to formed filtering material thickness 1.5 – 3 mm should be known weight kieselguhr. Filtration velocity represents one of the most important criteria for evaluating action kieselguhr. These materials do not affect the chemical composition in the fragrance and flavor solution of beer which is filtered [21].

The amount of filtering material to make the first layer filtering is 300-500 gr/m² filter area. On the second layer the first layer is placed using kieselguhr with fine particles, small soft porous solid. Porosity kieselguhr surface of the second layer defines the degree of clarity [10], [12]. To filter layer formation used 400-600 gr/m², 1 m² filtering surface.

On filter surface coating is added 800-900 gr / mm. After dressing filter rods with kieselguhr, remaining water is removed then begins the process of filtration [6], [7].

Filtering operation is performed during the experimental measurements under constant pressure. To gauge the speed of filtration for each filter layer thickness of kieselguhr are calculated to two constants α and V_e .

α – specific resistance

V_e – filtrate equivalent filtering medium.

Equivalent volume filter plate

$$V_e = \frac{b}{A}$$

Where the constants a and b express the dependence of the reciprocal value of the speed of filtration volume of the filtration process. Specific resistance of the layer can be equated on the basis of modified equation.

$$a = \frac{\mu \alpha}{A^2 \Delta P T}$$

Where: α – is the specific resistance of modified. For computation of specific resistance need the following data: viscosity, surface and pressure drop.

3. RESULTS AND DISCUSSION

Filtration process begins after the formation of the layer or filtering candles clothing, the second layer kieselguhr completion, controlled monitoring functionality, adjusting pressures, releasing the air. Stabilizing all parameters, that (EBC) to be less than 0.5 mixtures activated creep not to destroy particulate kieselguhr and holds suspension during the entire filtration operation.

Beer without filtered enters the filter from the bottom of his passes up through the filter rods which are wearing kieselguhr and through the middle duct followed in the top of filter, and filtered beer continues further conductor pipe.

Specific resistance of the layer thickness increases with filtering layer which should be $h_a = 1.5 - 5$ mm. throughout the filtration calculate the amount of kieselguhr to form the filter layer thickness and the result of mutual filtration velocity dependence of filtrate volume thickness.

After stopping the filtering process is washed with water in the opposite direction of the flow of beer, which renewed and extended filter layer absorption setting their use. Money lasts 10-20 minutes and is done with hot water, under pressure 0.7-1.2 atm.

After rinsing and sterilization is 1.2-1.5 atm. Pressure change. The filter should be cleaned in general.

Table 1. Show the preparation of the filtration, formation of the first and second layer, kind of kieselguhr, dosing, compiling time.

Table 1: Preparation during the filtration process

1. first layer				2. second layer			
Kieselguhr hyflo	quantity	50	kg	Kieselguhr Stand.	quantity	25	kg
Harbolite	quantity	5	kg	Kieselguhr filter. CEL	quantity	25	kg
1. first layer				2. second layer			
Flow	500 - 480		hl/h	Flow	480 - 460		hl / h
Time	07:10 - 07:26		min.	Time	07:47 - 08:00		min
Clarity	0.75		EBC	Clarity	0.09		EBC
Dosage		1		Dosage	2		3
Kieselguhr Stand.	quantity	25	kg	Quantity	25	kg	quantity
Kieselguhr FC	quantity	50	kg	Quantity	25	kg	quantity
Kieselguhr	quantity		kg	Quantity		kg	quantity
Stabilization Vulkostabil	quantity	40	kg	Quantity	20	kg	quantity
defense Divergan	quantity	15	kg	Quantity	15	kg	quantity

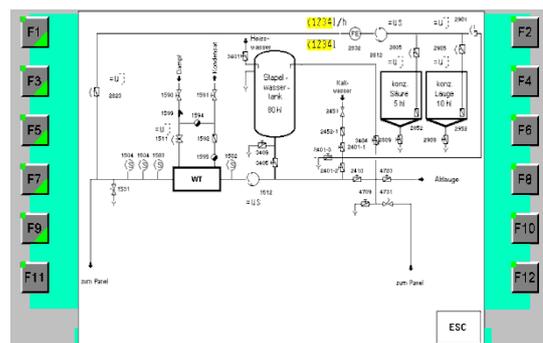


Figure 1: Preparing the filtration

In figure 1. Is shown preparing of the kieselguhr filtration that should be used, and the amount needed for the formation of filter layers, cleaning CIP system prior to preparation for filtering.

In table 2. Are present the results of the time of filtration, maintenance of the pressures in the filter layers, entrance and in exit filter. Beer filtering Volume derives from fermentation, or tank as well value of EBC.

Figure 2. Show the filter layers processing and amount of the beer, these samples are taken for analysis of beer.

Table 2: Results during the filtration process

Time	Change	Pressure entrance	Pressure exit	EBC	hl / h	Dosage l / h	T.Q. / FCK	D.T.	Quantity hl	jobation:
8.45	0.5	2.5	2	0.24	300	20	9	3		
10.3	0.6	2.6	2	0.34	300	18	9	3	512	
12.23	0.8	2.8	2	0.32	300	18	9	2	949	CO ² - 5.05
13.47	0.8	2.8	2	0.43	300	20	9	2	1362	
14.23	0.8	2.8	2	0.5	300	20	9	2	1550	
15.44	0.8	2.8	2	0.54	300	20	9	2	1952	

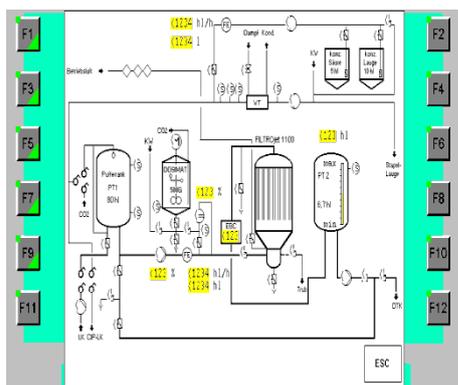


Figure 2: The formation of filter layers

In table 3. Are present the results of the microbiological analysis during the filtration process in Sh.A. "Birra Peja" – Peja, Kosovo.

Table 3: Results of microbiological analysis

No. analysis	Data incubation	Filtration		NBB - A	NBB - B	Agar malt	Data reading	respond NIBP	Not respond NIBP
		FCK / T.Q.	Samples						
1	10.07.16	FCK - 9	1	-	-	P	13.07.16	+	
2	10.07.16	FCK - 9	2	-	-	P	13.07.16	+	
3	10.07.16	FCK - 9	3	-	-	P	13.07.16	+	
4	10.07.16	FCK - 9	4	-	-	P	13.07.16	+	

4. CONCLUSION

- In the framework of this paper is to study the impact on the final product, filtration of the beer.
- Have to research the basic characteristics of filter plate layers for the clothing kieselguhr filters rods, filtration velocity, pressure decline during the flow through the filter layer, filtering layer resistance (laboratory scale).
- It was found that the volume and the equivalent specific resistance increase with thickness, a fact

which can be explained by the reduction of porosity thickness, also other factors, in all the probabilities, during the filtration does not change.

- All surveys are made from the obtained samples regarding filtration process from the beginning to the end of the filtration, which were analyzed at the central laboratory.
- Laboratory tests have shown that the thickness of the layer filter provides the minimum amount allowed in the number of colonies that is $h_a = 2.5 - 3$ mm.
- Based on positive laboratory results no penetration yeast cell colonies or different particles, bacteria, protein, hops substances, affect the beer poor transparency, we came to the conclusion that we will have a high quality beer filtration.

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