WORKING PROCEDURE ACCORDING TO THE REQUIREMENTS OF REFERENCE QUALITY STANDARDS - CASE STUDY FOR A BOILING DEPARTMENT FROM A BEER FACTORY

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Abstract: The beer industry is in a great national and international competition. Globalization of trades has greatly expanded the product distribution area and caused a major modernization and flexibility of the technological process of beer production. The latter allow a simple relocation of production capacities, regarding the size. In this context, issues of quality, food safety and consumer protection are very important and brewers must certify the work as required by SR EN ISO 9001:2008 and SR EN ISO 22000:2005 to meet competition. In this paper we propose to introduce, as case studies, how to draw content and links to other documents required by the management system of food quality and safety for the working procedure of boiling department of a brewery. The primitive beer wort is obtained in the boiling department, which in brewing technology plays a very important role and therefore needs a very good management of the technological process in this section.

Key words: brewing, wort, boiling**,** working procedure, management system, quality.

INTRODUCTION

Beer is the alcoholic beverage produced by fermentation of relatively clear beer wort obtained only from barley malt or and barley malt substitutes and

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flavored with hops or hop products. Beer production technology is one of the oldest and most complex biotechnology and the finished product, beer, is considered one of the most safe and hygienic food products, especially because alcohol concentration and compounds derive from hops. However, these claims are valid in terms of compliance required by the management system of food quality and safety (Kunze, 1996) (Păcală et al., 2009).

The raw materials used and the nature of the biochemical and physicochemical processes taking place along the entire technological process of production of beer require keping under strict control of all process parameters. This is because the concept of quality in recent decades has undergone significant changes.

Quality is increasingly aware and this is not just a problem of *Quality control department*, but a concern of all company staff. The technical problem quality has become more and more into a management problem. Thus, the production units increasingly feels the need to shift from control of compliance of product quality (good separation of the products improper), to quality management (coordinated activities that enable control of an organization in terms of quality) (Kunze, 1996). This means that the entire organization and in all activities do the best to achieve safe products and with high quality (marketing, design, procurement, production, sales, services, etc.).

In today's competitive market, with the continued increase of customers' requirements in terms of quality and food safety, quality control and food safety standards are subject to the requirements of references:

- SR EN ISO 9001:2008 (*, 2008) - *Quality Management Systems. Requirements*, which specifies requirements for quality management system where an organization needs to demonstrate its ability to deliver products that meet customer requirements and applicable regulations and is designed to increase customer satisfaction.

- SR EN ISO 22000:2005 (**, 2005) - *Food safety systems management - Requirements for organizations in the food chain*, that specifies requirements for food safety management system that combines the following key elements generally recognized for ensuring food safety along the food chain until the final point of consumption: interactive communication, system management, process control, HACCP principles, preliminary programs. According to these requirements for operation of quality management and food safety process procedures are documented and implemented that can be system procedures, operational procedures and work procedures.

This paper presents a variant of the working procedure *Boiling Process Control* of quality management system and food safety for the beer production process, which documents the steps for each organization which intends to implement a quality management system and food safety.

DESCRIPTION OF THE WORKING PROCEDURE

The standard set out in Table 1 are necessary by documenting the working procedure of *Boiling Process Control*. In this case study, for the boiling department of a brewing organization, technological operations considered are providing materials, malt and unmalted grinding, mashing and saccharification, lautering mash, wort boiling, hop dosage, hot trub separation, cooling and aeration wort, implementation of the *CIP* system.

Table 1. Correspondence between the requirements of reference standards SR EN ISO 9001:2008 and SR EN ISO 22000:2005

SR EN ISO 9001:2008	**Chapter**	**Chapter**	**SR EN ISO 22000:2005**
Production and service provider	7.5	-	-
Control of production and service delivery	7.5.1	7.2	Preliminary Program (PRP)
		7.6.1	Plan HACCP
Validation of manufacturing processes and service delivery	7.5.2	8.2	Validate combination of control measures
Identification and traceability	7.5.3	7.9	Traceability system
Customer property	7.5.4		
Preservation of product	7.5.5	7.2	Preliminary Program (PRP)

To document the work procedure *Boiling Process Control*, a flow chart showing operational sequences of production processes of primitive beer wort was prepared for the process of boiling department of a brewery. The working procedure is given in Figure 1 (which consists of six pages in this case, identified as Figure 1a, ... , 1f in the text) for the control of the technological activities in the boiling department of a brewery.
For the technological flow chart, specific representations are used: marking the beginning and end process technology, process / phase / operation, materials, by-product, product, control block, block and decision analysis, papers, documents, files, statements.

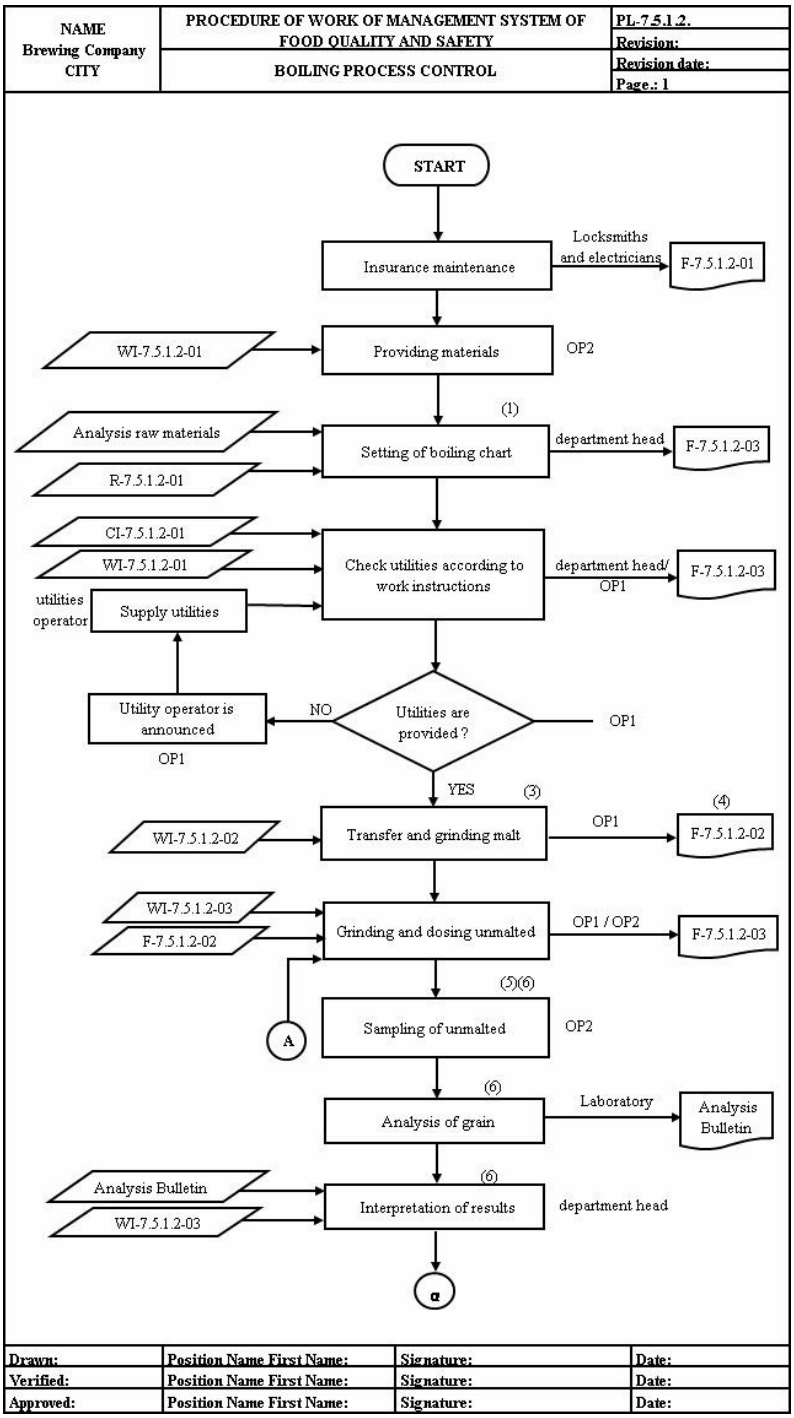

Figure 1a. Procedure of work for boiling process control

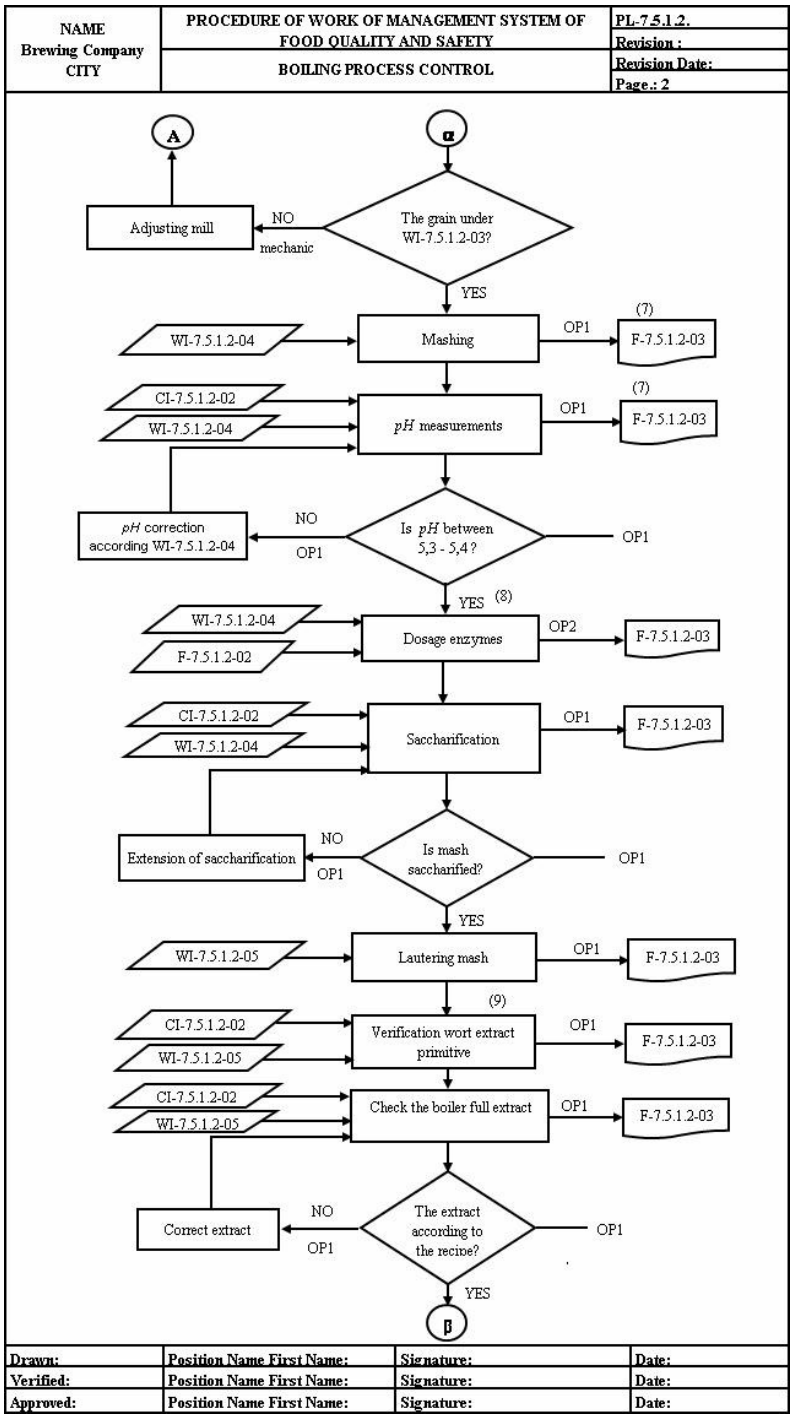

Figure 1b. Procedure of work for boiling process control (continued)

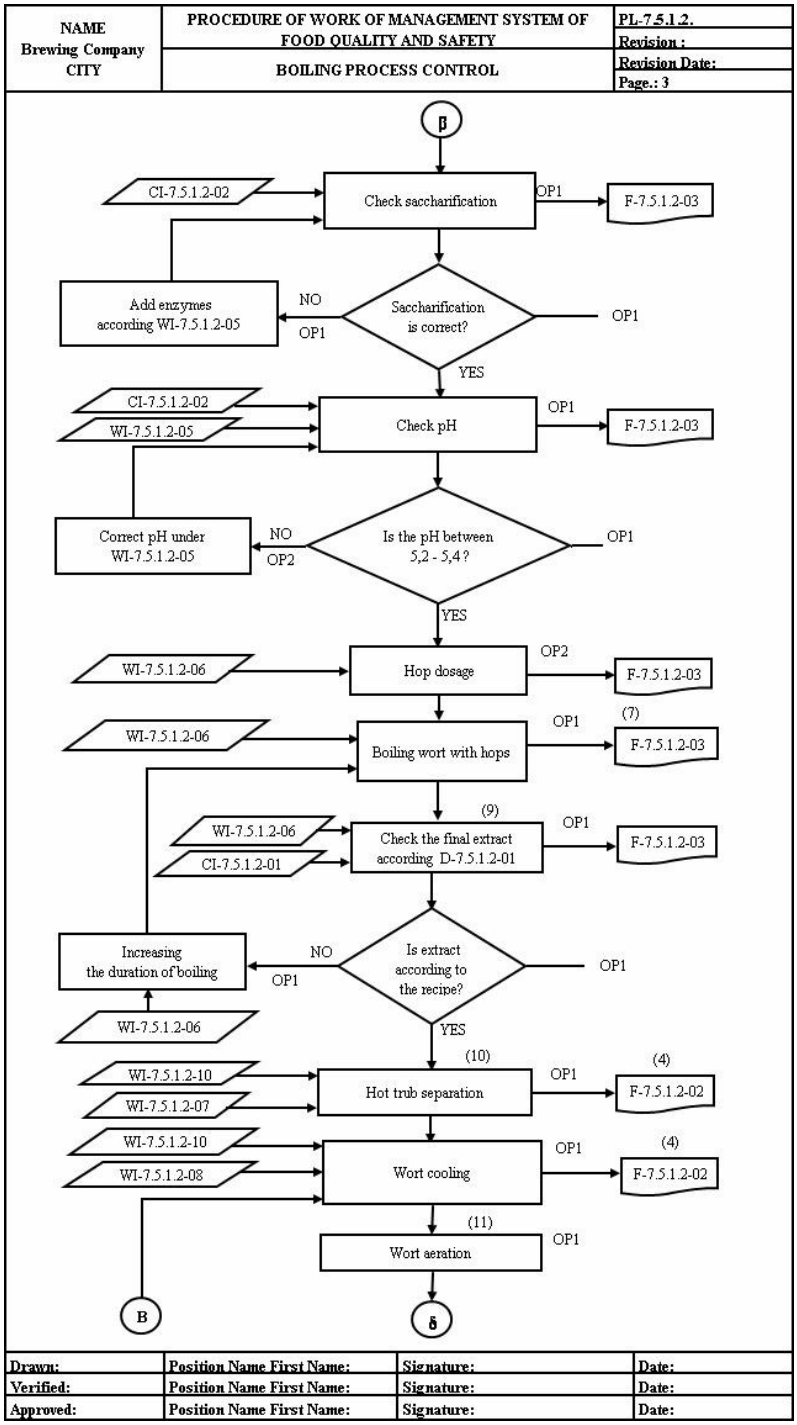

Figure 1c. Procedure of work for boiling process control (continued)

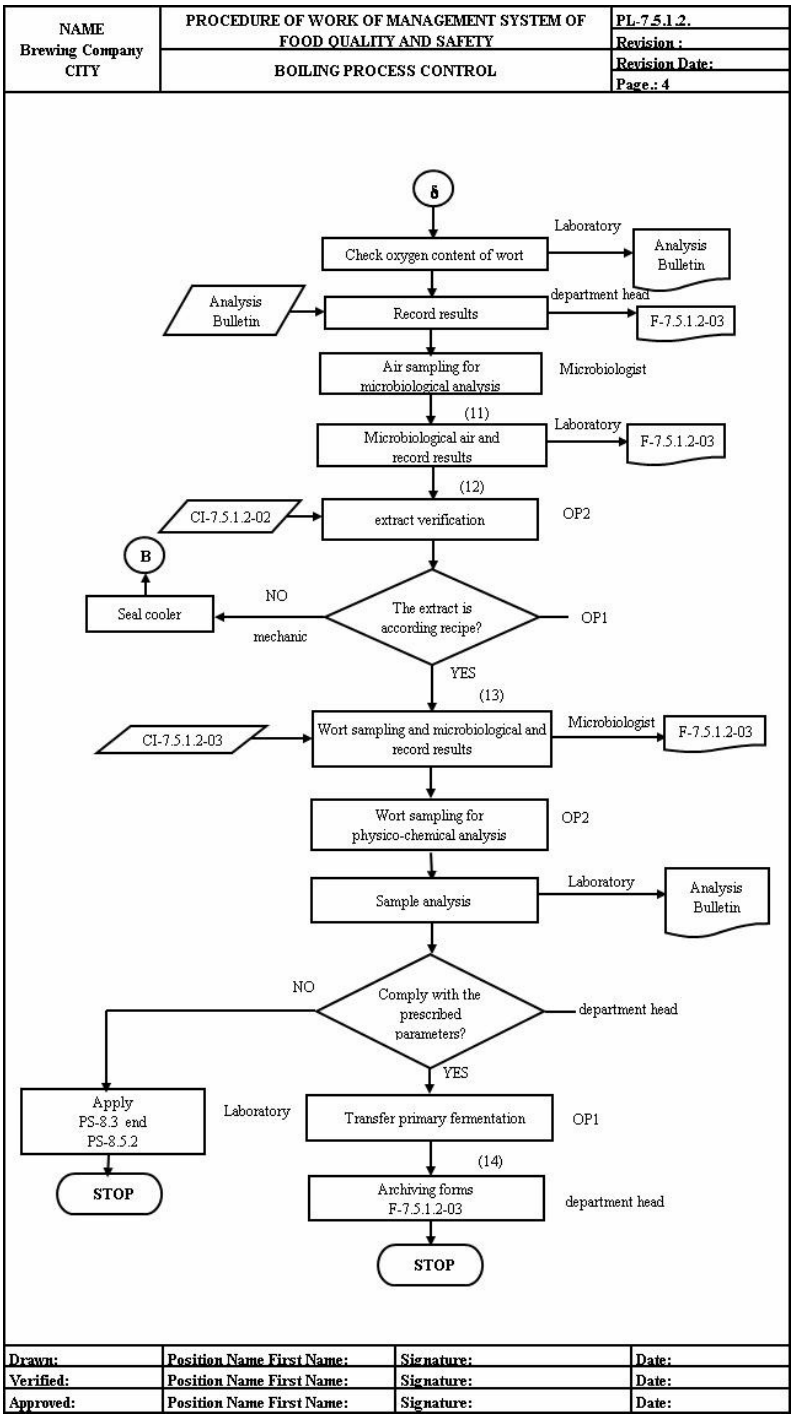

Figure 1d. Procedure of work for boiling process control (continued)

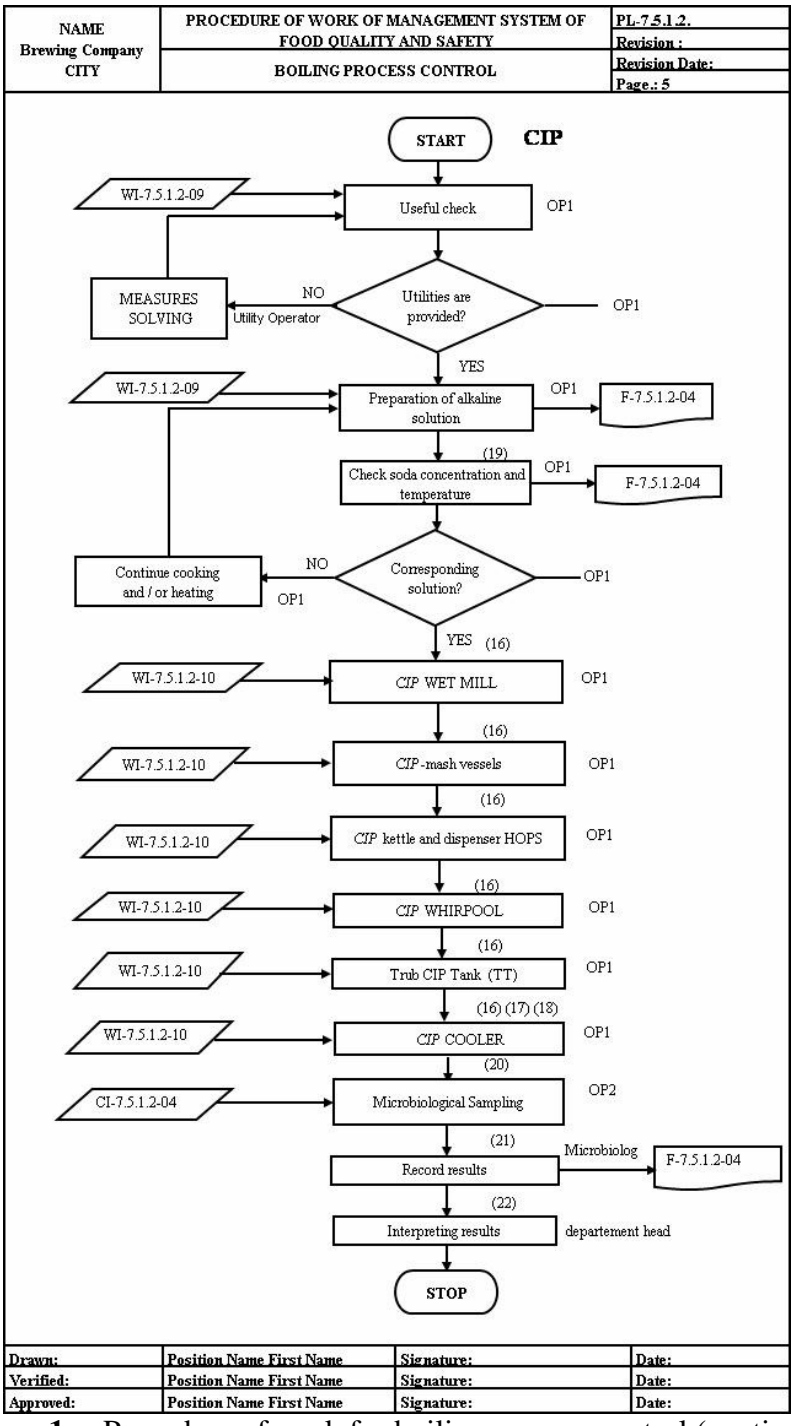

Figure 1e. Procedure of work for boiling process control (continued)

NAME Brewing Company CITY	PROCEDURE OF WORK OF MANAGEMENT SYSTEM OF FOOD QUALITY AND SAFETY	PL-7.5.1.2.
		Revision :
	BOILING PROCESS CONTROL	Revision Date:
		Page.: 6

Notes:

1. Diagram is determined by the head of department and technical coordinator. For each recipe and activity in part, be barred parameters as follows: enter password (known only by the head of department and technical coordinator) and introduce set parameters. Depending on the quality of raw materials, the head of department in the form F-7.5.1.2-03 introduce amounts of enzymes and additives used and the boiling times for each type of hops used.

2. Head of department performs sensory analysis of brewing water, once a day, and records in form F-7.5.1.2-03 corresponding to the brew which is made.Microbiological analysis of brewing water is under control plan.

3. Head of section introduces the formulation parameters and chart calculator boiling and grinding malt transfer operation.

4. This form contains all the data and computer-controlled process in its memory is preserved for 8 months. Form can be viewed if necessary, to analyze a noncompliance, at the request of department head.

5. Collecting such evidence is furnished to the department.

6. The activity is available only when using barley as unmalted.

7. Registration is at half time parameters prescribed.

8. Depending on the quality of raw material, the head of department will prescribe the dosage of additives and enzymes used in each brew.

9. If the extract is greater lautering continues to realize the value of the extract according to prescribed work instructions WI-7.5.1.2-05, if less than the prescribed duration increases until it reaches boiling values, according to R-7.5.1.2-01.

10. If the application is not as trub cone is flattened but then extends sedimentation hot trub from 45 minutes to 50 minutes at the next brew.

11. After cooling to 8 hL of wort aeration system must start automatically. OP1 purged condensation in air filter and then check if the cursor that indicates the amount of O_2 is situated at the prescribed level (8-9 m^3aer/hour). If appropriate adjustment can be corrected to the left of the valve air filter. Analysis wort be done according to O_2 in control plan. Microbiological test results are obtained after five days of air.

12. Be sampled at 100 hL wort be cooled to ascertain whether there leaks in the cooling system.

13. Sampling and sample analysis is under control plan by the microbiologist. Results are obtained after 5 days.

14. The samples cooled to 200 hl wort complete analysis of the technical specifications wort cooled, and go to the lab.

15. Archiving forms F-7.5.1.2-02 is made by filing in binders labeled. The label contains records period. Arch-file is kept in the office of head of department, so that the forms be legible throughout the retention period of 8 months.

16. Once a week, cleaning will be done according to the instructions of procedure WI-7.5.1.2-13, short-circuit.

17. After each four (4) brew will be cleaning up the cooler and mash fermentation route according to the instructions of working procedure *CIP*.

18. Once every two weeks and each time, after more than a stationary one week cleaning schedule will be logical *CIP* and working instruction of this procedure W.I.-7.5.1.2-10.

19. To determine the concentration of the sample goes to a lab for analysis and head of department over the results.

20. Water samples for microbiological analysis shall be taken after each circuit and cooler after sterilization. Samples go to the laboratory.

21. Microbiological results are obtained after 5 days. The samples after sterilization and cooler *CIP* sample is analyzed according to plan control.

22. If the results of microbiological tests are inappropriate for the next circuit temperatures increase concentrations and time keeping solutions and decided by the Head of Department.

Drawn:	Position Name First Name:	Signature:	Date:
Verified:	Position Name First Name:	Signature:	Date:
Approved:	Position Name First Name:	Signature:	Date:

Figure 1f. Procedure of work for boiling process control (continued)

Abbreviations used in the paper are: *WI* - working instruction; *F* - form, *R* - recipe, *CI* - control instruction, *OP*-operator; *PS* - system procedure, *CIP* - clean-in-place.

DISCUSSIONS

Working procedures should be logical, but easy to follow and give only the necessary amount of information, without omitting important aspects of the process for which they are derived. Too little information may mean a failure of the technological process management process and the decision too much information and causes a delayed execution and a confusing control. Quality control is not an optional extra in food processing. This is an essential component of a technological process of the beer industry, and not only, in order:

- to confirm the quality expected for each batch of material processed.
- to protect customers from dangers (*eg*: contaminated food) and ensure food quality and quantity that they pay.
- to protect production by checking suppliers, equipment damage (*eg*: stones and metal impurities in raw materials) and false accusations by middlemen, customers or suppliers.
- be sure that laws and regulations work on beer industry.

CONCLUSIONS

The working procedure presented in this paper illustrates for each step of the technological process the responsible for the technological process, the control methods in the working instructions and the forms to register the process parameters control.

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