INFLUENCE OF THE GRAIN SIZE OF REFINED SALT ON THE PACKING OF SALT IN SMALL BAGS AND MEASURES FOR PREVENTION

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Abstract: Through determining the grain size of refined salt produced by some refined salt plants in Hubei province and combining the actual conditions in salt packing in small hags, this paper summarizes the disadvantages that affect the salt packing in small bags when the amount of refined salt with too small grain size prevails and puts forward the ways to control grain size. Precautions are to be taken so as to ensure the quality of salt packing in small bags with lower cost and realize the salt packing in small bags in a environment friendly way.

Key Words: Refined salt, grain size, packing of salt in small bags, measures

With the continually technological development in China's salt industry, national projects of iodizing salt have completed. The salt industry packaging plant has been fully operational and a number of big packaging factories are being launched, which played an indispensable role for the protection of qualified supply of salt and purify the salt market

Salt packing has realized automatic packaging throughout our province Since 2000.Model V-70 produced by the company Shaxibu is used to as a main machine and others are used as a supplement.

Automatic salt packing experience in the past 8 years shows there are many factors that affect the packing of salt such as the quality of personnel and their loyalty to business, enterprise management, equipment maintenance, membrane adaptation, the quality of refined salt and other factors.In this paper, part of the salt production of refined salt factories in our province are sent for detection. We conclude the influence of the a heavy weight of salt particle of too small size on the packing, expecting to strictly control the particle size of refined salt in factories in order to ensure the smooth packaging of refined salt.

1DETECTION STATISTICS OF REFINED SALT IN PART OF THE MANUFACTURES IN OUR PROVINCE

In order to grasp and understand the situation of the production of refined salt factories in our province and to find out the rule of particle size on the salt packing, for a long time, we not only carried out detection of the content of sodium chloride, iodine and water following the standard of GB-5461, and also carried out detection following the

standard of GB/T13025.1. The testing sieve is followed the standard of GB6003-85 using the R40 / 3 series, the sieve sizes were 850μm, 500μm, 300vm, 250μm, 150μm. The test results are shown in Table 1.

Table1 refined salt particle production situation in our province

size(um) (%) Producer	850	500	300	250	150	Particle size（%）	Condition
A	0.00	15.13	37.11	27.06	13.72	93.02	Excellent
B	0.00	9.38	44.05	28.47	13.65	95.54	Excellent
C	0.00	11.27	47.67	20.63	14.52	94.29	Excellent
D	0.00	9.12	42.82	19.71	19.17	90.82	Excellent
E	0.00	4.40	31.30	21.95	29.87	87.52	Common
F	0.00	2.88	23.54	25.37	33.47	85.26	Poor

From Table 1, it shows that the products of the listed refined salt factories have met the particle size standard and even above the standard of GB5461. However in salt packing process, the particle sizes are different from batch and manufactures. When the weight percentage of particle size is small than 250 μm is heavy, it causes many adverse effect on the packaging.The performances as the following:

1.1 Quality of pouch of salt

In the process of packaging, due to the different situation of packaging plant and diversity of quality standards of the pouch salts, the salt industry have no unified quality standards. In order to ensure the quality of salt pouch, combining with the salt packaging, transportation, sales and other factors in our province, we has constitute provincial standard of pouch salt based on relevant national standards, laws and regulations. It explicitly regulated quantitative and qualitative requirements on the weight of salt in the pouch, sealing quality (horizontal, vertical closure), vent, print logo, which played an important role in safeguarding the guidance of salt packing in our province. When the weight of small sized refined salt is heavy, it has obvious influence on the packaging of salt. Specific performance as follows:

1.1.1 Effects on sealing strength of the pouch salt

When the weight of small size refined salt is heavy, it will cause uneven particle size. Under external forces, the small size salt have different gravitational time from the large size salt, and it will be mixed in the upper and lower sealed pouch, which not only affects the appearance and degree of formation but also reduces the sealing strength of salt pouch. Irregular salt mixing in the pouch of salt will weak the sealing strength. The sealing strength will decrease by 8% ~ 12%, which brings hidden problem in storage, transportation and sales.

1.1.2 It is hard to control the ventilation of pouch salt of small particle size

In order to protect the salt package in the storage, transportation and other links, manufactures in our province adopt automatically packing, using the sponge folders to exclude the air in pouch. If the weight of small size salt is heavy, it means the particle size are unevenly distributed which makes it difficult to control vent size and standardization. For example , if the vent size is too large, the small size salt will be leaking out, which will decrease the weight, if the vent size is too small, it is hard for air emission, which brings hidden problem in storage,

transportation and sales.

1.1.3 Weight of medium and small size refined salt will cause the particle size uneven, which results in fluctuation of weight of pouch salt.

In process of salt packaging, the content of water and size of refined salt are two key factors affecting the weight of pouch salt. Salt packing industry is using the volume-type packaging machine. If the refined salt contains too much small size salt, it will result in incorrect measurement of the weight. In the process of packaging salt, if the fluctuation is between10g to 20g per 500g product, it will bring negative impact on the control of the salt weight.

1.2 Impact on the packaging machine and equipment

When the weight of medium and small size refined salt is heavy, it will not only has obvious influence on the packing quality, but also it has influence on the packaging machines and related equipment, such as wear, corrosion and consumption. It has the following aspects:

1.2.1 Impact on the transmission components of packaging machine.

Due to the smaller size of salt, small particle is spread at every corner. In order to lower and reduce the wear of different part of the packaging machine, some oil was added to the joint of the machinery part, if the salt is mixed with the oil, it will increase the wear and corrosion of components and the shorten the life of components.

1.2.2 Impact on the electrical equipment components of the packaging machines

When certain proportion of the small size salt is adsorbed on the surface of electrical components, and if the air humidity is high, it will become corrosive "salt water". If the "Salt water" is infiltrated to the internal electrical components, it will cause unexpected problems of the electrical equipment. If it is not done properly, even the burning of circuit boards of the electrical components may happen.

As we all know, electrical controlled cabinet and the central control cabinet equipment is the "heart" and the "brains" of packaging machine, which includes many electrical components such as circuit boards, PLC, transformers, contactors, inverter, air switches, etc.. Although those machines have a good seal for the central control cabinet, with aging of sealing materials of the electrical controlled cabinets, small size salt may sneak into the gap of the equipment. The immersion of small particle size increasingly causes problems such as the short circuit of the electrical controlled cabinets, corrosion of electrical components, and the phenomenon of soft, which cause much inconvenience to the repair, troubleshooting of the central control cabinets and purchasing of spare parts.

1.2.3 High content of small size salt increases the consumption of expendable items and shorten the life cycle of the subsidiary equipment.

The absorption of small particle of salt on the surface of transmission belt of the packing machine not only impedes the smooth running of the walking membrane, it also brings wear and tear for the transmission belt. According to the statistics, if the content of small size salt is low, the general life cycle is 30~ 50days. When the content of small-size salt is high, the life cycle is 20 ~ 30 days. Because of the absorption of the small size salt, the wear and tear of tooth-belt increases, which increases the cost of maintenance.

Some packaging plant reduces the air relative humidity in factory (workshop) in order to improve the working environment with installation of air conditioning dehumidifiers. Some factories even install voltage regulator to stabilize the voltage. The small size salt floats in the air absorbing

moisture in the air to form a "salt water drip", which shortens the life cycle of the air conditioners, dehumidifiers and regulators due to corrosion.

1.3 High content of small size increase the wear and tear of refined salt and the packaging cost.

High content of small size salt increases wear and tear on the refined salt. Through the statistics, the small size salt expelled from the dust extraction system accounts for about 2‰~5‰ of the total salt production. Estimated on the base of annual production of 10,000 tons, the small size salt is 20 ~ 50 tons per year, which not only pollutes the environment, but also increases the cost.

1.4 High content of small size salt has potential health influence to the staff

It is reported that excessive intake of salts does harm to human health and suffer from many diseases such as high blood pressure heart disease osteoporosis and so on. Although some preventive measures had been taken in the progress of salts packaging, workers still have more intake than the normal person and face potential health hazards due to the spreading of small particle size salts.

2 the prevention and control measures to small size salt

From the above analysis, the refined salt contains too much small particles, which has bad effects in salt packaging. To ensure quality of the pouch salt, reduce packaging cost, protect staff's physical health and make green salt packaging come ture, the control measure and the prevention are recommended as following:

2.1 Every refined salt factory should take the measure to control the particle size of the refined salt including usilization of new technologies and arts in the process of evaporation, crystallization, drying and paying much attentions to the dust-off. Resolutely put an end to the production process without dust free operation in violation of the disciplinary process, and regulate recycling of dust.

2.2 The salt-packing plant (point) must formulate and implement strictly inspection procedures, and especially in sampling, testing and determination the standard must be obeyed strictly. The inspection index should include the quantity of sodium chloride and iodine, moisture, particle size and so on in order to avoid using products of under level. If it is possible, salt-packing plant should communicate with refined salt manufactures to make their own suitable standards based on the GB5461 so as to meet the needs of the packaging unit of the salt requirements.

2.3 The salt-packing plant (point) should enhance process control and improvement. The dust removal system and checking standard should be established together. In the process of design and transformation, salt loading should separate the various units, such as refined salt feeding systems, packaging machine, the central control cabinet, packing systems, pouch of salt transport systems, palletizing system. Units should have effectively cut off and seal, which can effectively reduce the impact of sub-salt of the small size of salt.

2.4 Revision of the standard of GB5461 by professionals of the administrative department. If the condition is mature, the particle size of refined salt (all levels) will increase five percentage on the basis of the same screen size, another solution is to adjust the screen size from 0.15μm ~0.85μm to 0.25μm~600μm without changing the particle size standard, which will improve the particle size or the uniformity of particle size from the standard, ensuring the smooth progress of salt packing.

3 CONCLUSIONS

Salt packing is the last session in the

process of salt production into the market. Only when every aspect of salt production is implemented strictly following the standard, which includes the chemical indexes, health indexes, potassium iodate indexes. It also should control the physical indexes, especially the particle size. Only in this way, it can assure the smooth running of the salt packaging and distribution, reducing the packing cost and protecting the environment, which provide qualified salt to the market and realize green packaging.