PRELIMINARY DISCUSSION ON THE INDEX OF VACUUM SALT MAKING

Xiang Shouze
Penglai Salt and Chemical Co., Ltd. of Sichuan Jiuda Daying, Sichuan 629300

Abstract: This paper mainly expatiates the suitable design of salt making enterprises (facilities) technology and running level of running management, scientific confirmation of the quantity value, effective communion of the index.

Key Words: Salt making index, confirmation of the measurement, communion of index.

1. INDEX OF MAIN DISCUSSION

1.1 Design of index

1.1.1 Definition of index

Index is the description about the situation of objective things by people.

1.1.2 Characters of index

Index is set for the description need of the describer, so it possesses subjectivity. To describe the same thing by different people, there exist different index systems. Index is the objective reflection of described object, so it also possesses objectivity. For different things, one people have different index systems. In terms of the descriptive certain degree, it can be divided into qualitative index and quantitative index; in term of the descriptive consummate degree, it can be divided into many parallel index system; and in term of the depth degree, it can be divided into many levels of index system.

1.1.3 Design of index

The design of index, excluding the obligation of the objectivity of index, is the most central embodiment of subjectivity. Therefore, different demands will bring different designs of index. For example, for the running situation of the enterprises, standing on the angle of management of macroscopical level, the government needs a set of related index system; investors, financers, managers, suppliers and dealers etc. have each design index for the demand of description.

1.2 Index of main discussion

The subjectivity and objectivity of index give rise to its variety and complicacy, also because of the influence of technology and running management on the index, it possesses decision and indivisibility of the interaction. Therefore, the author discusses the set, confirmation and its application of vacuum salt making index only from the point of view of the consumption and productive efficiency of vacuum salt making running and from the running management situation, technological situation and its synthetical factors. The relation between index Z and factors (x,y) can be described as following:

$Z=f(x,y)$ x: technical factor y: running management factors

2 ADVANCE OF INDEX

2.1 The aim of index

The set of the index is based on the objective and true reflection of the energy consumption and productive efficiency of the facilities of vacuum salt making, it contains main factors(technical factors and running management factors) which influence the index. It help the related people to analyzes the technical situation, running management

situation and the work quality and efficiency of organization people; from the landscape orientation of enterprises(facilities) to analyzes the distance of technology and management, ascensive direction, aim and exerting point; lay the basis for the management to grasp the industrial technology, running situation of the management, research and establish the related policy.

2.2 Advance of index

2.2.1 Some actual indexes

At present, the indexes to describe the energy consumption of vacuum salt making contain: A. steam consumption per ton of salt, the boundary of the value for accounting contains evaporation drying; B. electricity consumption per ton of salt, the boundary of the value for accounting contains evaporation crystallization, dehydration and dry packing, circulation water. The indexes to describe the productive efficiency of facilities contain: C. production intensity----the salt output per unit area (m^2) , its boundary of the value for accounting only contains the heating area of evaporator; D. evaporation intensity-evaporation water per unit area (m^2) , its boundary of the value for accounting only contains the evaporation section area of evaporator.

2.2.2 Evaluation of author

Evaporation intensity reflects the intensity of separating steam and water of evaporator, the more the value, the more the productive capacity of the same(diameter)facilities; this is the aim of productive enterprises, design research and industrial management, it is ok if the effect of separating steam and water is not bad, however, this index not only scientifically contains the technological situation of separating steam and water of evaporator, but also contains running management situation.

The difference of raw materials component and concentration for producing salt by different enterprises(facilities) leads to the difference of productive flow and its control parameter, which will cause the same technology, but the different consumption for running management situation and productive intensity, therefore the definition of the three indexes(A,B,C) isn't scientific, and the index accounted by this definition is difficult for analyzing and comparing.

2.2.3 Advance of index

The problems mentioned above are mainly due to the evaporation crystallization, and the essence of evaporation crystallization is to separate the water from the solution(raw material), and when the separation of the water from the solution achieves some degree, salt will come out. Therefore, the "salt" in the indexes above should be changed into "water". Excluding considering the influence of the component and concentration of raw material on these indexes, under the same (facilities and raw material)situation, the temperature difference of the heat transmission will lead the difference of electricity consumption per ton of salt. Therefore, the influence of temperature difference of heat transmission on the electricity and productive intensity should be also considered, the rationality of calculating boundary should be considered. Additionally, setting unit electricity consumption in packing to describe the packing technology and running management situation.

Setting: "electricity consumption per ton of salt in packing", "steam consumption per ton of salt in drying", "electricity consumption per ton of salt in drying", "steam consumption per water in evaporating", "electricity consumption per water in evaporating", " evaporation water quantity per unit area and unit difference temperature", " evaporation water quantity per unit area and hour", "annual effective productive hour" and the 11 main kinds indexes such as quality index, brine consumption and water consumption index to describe the technology and running management situation of the whole vacuum salt making facility.

3 QUALITY VALUE OF INDEX

The electricity consumption per ton of salt in packing, steam consumption per ton of salt in drying and brine consumption per ton of salt index etc., whose boundary(range) for accounting is going without saying, and the quality index can be tested but other accounting boundary of index value need to be researched.

3.1 Electricity consumption per ton of salt in drying

Electricity consumption per ton of salt

in drying should contain the electricity consumption of dehydration and drying themselves and their material transmission.

3.2 Steam consumption per ton of water in evaporation

At present, steam consumption of evaporation usually contains the steam consumption of evaporation for vacuumizing. The author considers that the steam consumption of evaporation should not contain the steam consumption of evaporation for vacuumizing, and only contain the steam entering I effect evaporator. The steam for vacuumizing is not used in evaporation but only to produce condition for vacuum evaporation and the production of this condition can be replaced by the vacuum pump with electricity consumption or water jet pump. Separating them is good for optimization of evaporation flow, it will be bad on the contrary.

3.3 Electricity consumption per ton of water in evaporation

As the same as above, the electricity consumption per ton of water in evaporation should contain the electricity consumption of evaporation crystallization, the circulation water and equal quantity of electricity consumption of evaporation spraying etc. The circulation water and evaporation spraying create conditions for the effective running of vacuum evaporation. Meantime, under this conditions, the higher the evaporation degree, the more the energy consumption of circulation water and evaporation spraying, but the less the electricity consumption of evaporation, and it should be according to the actual situation of the enterprises(facilities) to rationally ensure the control for vacuumizing, in order to make the lowest electricity consumption per water of evaporation. Separating them is not good for seeking for optimization. As the same, extending the boundary of accounting the electricity consumption to dehydration and drying even packing is also not for seeking for optimization. From the point of view of energy resources, the accounting of the equal quantity of electricity consumption of evaporation and spraying is better to base on the useable energy, the result of which can be equal to electricity; from the angle of economy, it's better to calculate based on the price.

3.4 Water consumption per ton of water in evaporation

The index describes the utilize efficiency of producing water of enterprises and its boundary of accounting: the water for consuming excluding the life water and logistics water.

3.5 Productive intensity index

Productive intensity index---the evaporation water quantity in unit area, unit hour, unit temperature difference, the character of this index is to describe the number of the heating exchange parameter of heating exchange facilities, which is not only related to the performance of facilities, but also to the running management. In evaporation system, the parts which can have the function of heating exchange contain the heat chamber of evaporation, preheaters and heater, therefore, the calculating boundary(range) of this index value should contain all of the heating exchange areas of preheating and heating materials in evaporation. Because of the different feed steam parameter of first effect, different vacuum degree in the last effect will lead to different productive intensity of other same situations, therefore, the plus average effective heating transmission temperature difference should be accounted, then the result is the true description of the exchanger technology situation and running management situation.

3.6 Special indication

The calculation for water quantity of evaporation and brine consumption should base on the water and salt quantity in the brine of evaporation system. According to it, every index calculated is the true description of technology and running management situation of enterprises(facilities), and the equal quantity of electricity of evaporation and spaying used for exchanging should be calculated on the useable energy.

4. ATTITUDE FOR OMMUNICATING INDEXES

4.1 The index of only communication facility

At present, "economic and technologic index of well and rock salt" includes the economic and technologic index in macrocosmic and microcosmic level of enterprises. The macrocosmic level describes the running situation of enterprises, which not only lies on the market environment that the enterprises face to and the situation of the price of related projects, but also lies on the technologic situation and running management situation. Therefore, the communication of it is not good for the analysis of technology, running management situation and advanced measures between enterprises, but because it is related to the running situation and market competition station of enterprises, many enterprises keep it secret, therefore the collection of the data is not full and true. Because of this, it is not need to be communicated. However, the microcosmic level is the other way round of the macrocosmic, it not only reflects the technologic and running management situation of enterprises(facilities), but also is not related to the secret of technology and management. And through communication, we can find the technologic and running management distance between enterprises(facilities), stimulate the enterprises to search for the drive of progress, which will be good for the promotion of advancing the technology and running management of industry and enterprises. Therefore, it is very necessary to communicate the economic and technologic index in microcosmic level.

Because of the big difference of the salt mine embedding situation, the brine exploitation between enterprises is not need to be compared, therefore it is not considered.

4.2 Index should to be communicated

4.2.1 Quality index

Quality is the life of enterprises, and it is concerned by enterprises, consumers and government. Its good and bad not only lies on the quality standard and the requirement of consumers, but also depend on the technology and running management situation of enterprises(facilities). Therefore, it should be labeled as the communicated index, and the index system should be ensured by standard and the requirement of consumers.

4.2.2 Consumption index

The high and low of the consumption directly determine the cost, which is concerned by enterprises very much, and it also determine the level of resource consumption and the degree of environment friendly, it is then concerned by government and country. Therefore, it should be labeled as communicated index, and its index system includes brine consumption, electricity consumption, steam consumption and water consumption. The good and bad of its value not only lies on the technologic situation of enterprises(facilities), but also lies on the running management situation of enterprises(facilities).

4.2.3 Efficiency index

The efficiency directly decides the exerting effort of putting the facilities into function and the good and bad of some consumption, which is concerned by enterprises and investors, therefore it should be in the communicated index. The good and bad of its value not only lies on the technologic situation of enterprises(facilities), but also lies on the running management of enterprises(facilities). Its index system includes "productive intensity", "evaporation intensity" and "effective production hour of per year" etc.

5 . THE ISSUES NEED TO BE DISCUSSED

The electricity consumption factor belonging to the index values which influences the productive intensity is not considered. For the form of flow speed which is the necessary heat exchanging condition of heat exchanger, it needs power consumption, and how to make it with good heat exchanging effect but with small electricity consumption? Can we set a productive intensity index which is evaporation water quantity per unit heat exchanging area, unit temperature difference and unit electricity consumption to describe the technology and running management situation of heater of evaporator. The count boundary of its value is the electricity consumption of circulation pump of evaporation crystallization and average effective heat exchanging temperature difference of evaporator of heat exchanger and the water quantity for evaporation from brine.