



Research Explosion Protection in Chemical Instrument Design

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Abstract: At present, the national industry has made great progress and great development. In order to achieve safe and effective production in actual production, it is of great significance to accurately understand and master chemical equipment, including its operating parameters and internal basic conditions. Especially when dealing with the design of chemical instruments, we must adhere to scientific and reasonable concepts, prevent risks, ensure the safety of chemical instruments, and ensure control quality. Therefore, it is particularly important to study the explosion-proof problem in the design of chemical instruments, analyze the principle of its area division and explosion-proof, clarify the existing problems, and seek countermeasures.

Keywords: Chemical Instrument; Explosion-Proof Problem; Explosion-Proof Measures

1. Chemical Instrument Explosive Area Division

1.1 Explosive area planning

GB50058-1992-Specification for design of electrical installations in explosion and fire hazardous environments points out, there are roughly two types of explosive areas, which are explosive hazardous gas areas and dust hazardous areas. From the standard we know that the way it is displayed is identified by numbers for simple legibility and understanding. Under the standard of explosive hazardous gas area, there are multiple numbers, such as 0, 1, 2, 10, etc. The larger the number, the less dangerous it is. Generally speaking, the more dangerous it is, the easier it is to explode.

1.2 Explosion-proof instrument division

In the chemical and chemical industry standards and specifications, there is a special introduction to chemical instruments, which effectively classify instruments, mainly explosion-proof chemical instruments, non-sparking chemical instruments, positive pressure chemical instruments and so on. Among them, there is a special classification of explosion-proof substances for explosion-proof chemical instruments. Because the chemical and chemical industry is a very dangerous industry, there are strict classification standards^[1]. According to the relevant standards and requirements, explosive substances are divided into three categories, they are first, second and third categories. For example, we refer to mine methane as Class I, and explosive gases as Class II. Among them, the second type of explosive gas is divided into the second type A, the second type B and the second type C.

2. The principle of explosion-proof of chemical instruments

2.1 Control explosive gases

Generally speaking, three conditions are required to generate an explosion, so one or two or even all of the conditions can be changed manually, such as eliminating dangerous gases, and then adding chemical instruments to this space. How to

eliminate and explosive dangerous gas, the general method is to extract the unstable gas, and backfill inert gas or clean gas. This will make the high pressure in the space (relative to outside the space) suitable for arranging chemical instruments. In general, the explosion-proof method of online analysis can be used, that is, the situation of positive pressure explosion-proof instrument cabinets can be determined by instruments. At the same time, grasp the situation of chemical instruments for the first time, discover their possible risks in time, and prevent explosions^[2].

2.2 Control detonation source

Zero tolerance for danger, we must curb the occurrence of danger from the beginning, grasp the source, and prevent and reduce the possibility of explosion. For example, the explosion that may be caused by sparks is managed and controlled manually; or when the outside temperature of chemical instruments exceeds the safe temperature, manual intervention and control are also selected. Generally speaking, the safety barrier technology is applied to cut off or limit the chemical instrument that may fail to ensure that it cannot cause sparks. In addition, it is repeatedly confirmed that the temperature outside the chemical instrument is within the safety limit.

3. Problems Existing in the Design Process of Chemical Instrumentation

3.1 Unscientific design

The design of chemical instruments must be based on the nature of its work and the external environmental conditions of the work, and cannot be designed according to the drawings and divorced from reality. However, in actual operation, most chemical design field surveys lack scientific rationality, resulting in the existence of unscientific and unreasonable design schemes, which greatly affects the realization of its explosion-proof function and early warning function. In addition, due to the lack of actual and specific experience, the designed instruments can not meet the different needs and production requirements of enterprises, so that the instruments cannot guarantee normal operation, which undoubtedly causes the safety hazard for the explosion of chemical instruments^[3].

3.2 Poor quality of designers

Although China's chemical industry has made great progress and development, there are still obvious weaknesses in the field of chemical instrument design. For example, the production and design processes are not transparent and open, which leads some speculators to use staff who lack professional skills for design and production, resulting in the greater danger of the designed instruments. Once these instruments that are not designed according to professional standards complain about actual work, they will not only lose the early warning and explosion-proof functions of the instruments themselves, but also cause loss of life and property to society and the country. If things go on like this, it will also cause a vicious circle and damage the progress and development of my country's chemical instrument design.

3.3 Relevant institutional system is not perfect

The system is to ensure that the work runs according to the specified requirements, but the construction and supervision of the relevant system in the design of chemical instruments are imperfect and lacking. This leads to companies and individuals who are pursuing interests breaking the rules during design and acceptance. At the same time, the relevant units do not pay attention to the explosion-proof work of chemical instruments, and still use the old system in terms of system construction, and have not formed a complete system. This also hinders the design of chemical instruments in my country, which in turn affects the progress and development of the entire industry^[4].

4. Methods to improve the explosion-proof level of chemical instruments

4.1 Improve the chemical explosion-proof design level

With the development of modern science and technology, the advancement of technology in the chemical industry has been promoted, and the level of production and preparation has gradually improved. The development of chemical automation has promoted the completeness of chemical instrument performance. On the other hand, the design of modern instruments will be more sophisticated and complex. The complex design of the instrument means that there are more components, so the probability of heat failure and explosion in the event of a component accident increases. Therefore, it is necessary to adhere to scientific and reasonable design, make scientific plans, and achieve precise control. The explosion-proof design can timely and accurately collect the actual changes of the components, such as temperature, flow and pressure, and the scientific and reasonable design can realize the transmission of real-time information to the terminal. This allows staff to rush to maintenance and management before danger occurs. Therefore, improving the explosion-proof design of chemical instruments is also a guarantee of their quality.

4.2 Define blast area and instrument demarcation

An obvious attribute of the chemical industry is danger. The reason is that raw materials with extremely unstable properties are used in production. Explosiveness is the most likely to occur and the most destructive point. Therefore, it is necessary to strictly divide the explosion area. Implement the GB50058-1992-Specification for design of electrical installations in explosion and fire hazardous environments, strictly implement safe production, and strictly regulate the implementation, and at the same time take active, scientific and reasonable measures to prevent possible explosions. Therefore, in the operation and work of chemical instruments, relevant personnel must make explosion-proof signs. Generally speaking, marking is done on the shell or other surfaces of explosion-proof instruments, which is also conducive to the operation and maintenance of management personnel, and improves the safety of operators and chemical instrumentation equipment. In addition, it is necessary to design and implement scientific and reasonable countermeasures according to the specific explosion-proof type that needs to be faced, including the explosion area, danger and other aspects. At the same time, the design of the instrument must be based on the corresponding rules and regulations and specifications, and the safety of chemical production must be guaranteed^[5].

3.3 Explosion-proof measures

In the process of chemical instrument design, explosion-proof instruments should be selected, which have good performance and help to improve safety, thereby effectively reducing safety problems in production. To avoid the explosion of chemical instruments, scientific and effective design methods should be adopted, combined with advanced design concepts, and reasonable explosion-proof maintenance equipment should be adopted to comprehensively improve the safety of chemical instruments. In the design phase, the design should be carried out according to the actual production situation and process requirements. During the application of explosion-proof chemical instruments, the safety of the instruments can be improved from the inside out. The explosion-proof casing can ensure the safe operation of the instrument and effectively reduce the probability of explosion. In the process of use, do a good job in the configuration of various instruments and equipment, and it is easy to cause sparks to be placed in the explosion-proof light. Even in the event of an explosion, the explosion-proof enclosure reduces damage and ensures that individual equipment can continue to operate.

Conclusion

We should adhere to the requirements of scientific and reasonable and advancing with the time to design reasonable and scientific chemical instrument design, improve the explosion-proof level and quality of chemical instruments, find and solve problems. At the same time, we should also promote the research and application of explosion-proof problems in the design of chemical instruments in my country, which is conducive to promoting the healthy development of the chemical industry in my country.

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