

Summary of aviation kerosene tank safe operation integrity evaluation system

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Abstract

The risk of aviation kerosene storage tank is mainly based on its integrity monitoring and evaluation due to its own characteristics, which is the most important aspect of aviation kerosene risk monitoring. This paper mainly from the common problems of aviation kerosene storage tanks integrates data, from aspects of the main research content, key technologies, the integrity of the evaluation describes the aviation kerosene storage tank risk monitoring and evaluation methods.

Keywords

Aviation kerosene, risk, testing, evaluation.

1. Introduction

Aviation kerosene is a kind of transparent liquid, which is made up of the components of the straight run distillate and the necessary additives. When the sun shines on the metal tank and spherical surface, the temperature can be up to 70-80°C, Part of the liquid hydrocarbon component gasification, through the breath valve in the form of oil and gas into the atmosphere environment^[1-3]. On the one hand, the loss of oil and gas is also a waste of resources, it will cause the loss of oil and gas is also a waste of resources, while causing environmental pollution; On the other hand, in the high radiation environment, gas quality decline in the process of oil and gas volatilization, kerosene can not completely burn, affecting the normal flight of the aircraft, it is likely to lead to a more serious accident^[4-6].

As a kind of fuel, aviation kerosene has the same characteristics as the common fuel such as gasoline and kerosene, but because of the particularity of the application object, it is decided that it is different from other common fuel. Due to the stored aviation kerosene are required to undergo strict inspection, so there are generally no problems in the aviation kerosene production processes, therefore, the storage and transportation of oil is very important and easy to the problem, and the storage tank is the most important part in this process, and its safe and stable operation is very important.

2. Common problems of aviation kerosene tanks

Aviation kerosene tank belongs to a normal pressure tank, its security problem is nothing more than two aspects, one is the deformation of the tank caused by position offset, the other is the tank deformation caused by the tank pressure (which is the main research direction of this subject). One of the key components in the safe operation of the tank body is the breathing valve. At present all of the domestic aviation kerosene storage tanks above are installed with one or more breathing valve, these breathing valves from different manufacturers, having different models, but the basic principles are roughly the same. Through the investigation of different regions and different types of storage tanks, there is a common problem is that the operation of the breathing valve itself can not get a good monitoring^[7-8].

Common problems are as follows:

(1) Breathing valve dark turn position is high, inspections and maintenance is more inconvenient. Especially in some special areas or special weather conditions, there are a lot of difficulties to ensure the daily inspection and maintenance, and it is difficult to find a problem of breathing valve timely;

(2)Due to the full understanding of the safety of the tank for the operation of the breathing valve, many units are often removed one of the vacuum valve or pressure valve plate, to maintain the storage tank is always in the atmosphere and connectivity;

(3)Breathing valve and installed together with tank, disrepair, after the replacement of new breather valve, calculation of related parameters unreasonable, the valve disc configuration is not reasonable;

(4)Cold and hot alternation in the extreme cold weather conditions in the northern region, it is easy to freeze the valve disc to death, daily maintenance procedures and maintenance is difficult to find the situation from the outside.

Based on the above issues, the own security of aviation kerosene storage tank can't get a good guarantee. To study the operation status of the respiratory valve in real time, real-time monitoring, timely warning and alarm processing is of great significance to ensure the safety of the storage tank, and the safe and stable operation of the aviation flight.

3. Research contents

(1)Investigation on operation and monitoring technology of aviation kerosene storage tanks at home and abroad;

(2)According to the characteristics of the storage tank of Jilin branch in China, the feasibility study is carried out;

(3) Research on real time monitoring system of aviation kerosene storage tank.

4. Key technology

(1)Development of professional high precision sensor under the condition of explosion protection in the 0 area;

(2)Multi-source monitoring data information fusion;

(3)Based on the analysis of the real-time pressure of the high precision sensor, judge the health index of the tank according to the expert system analysis.

5. Integrity assessment

For the selected aviation kerosene storage tanks, use aviation kerosene storage tanks safe operation of real-time monitoring system, we can achieve the following indicators:

(1)System reaction time: less than 90S;

(2)Alarm rate: 100%;

(3)False alarm rate: less than 5%;

The integrity evaluation of aviation kerosene storage tank is based on risk assessment and hazard identification, the appropriate test method is given according to the potential failure mechanism and the failure risk of different medium and basic condition in the tank and auxiliary facilities, scientific and reasonable test cycle and integrity test strategy is formulated, rational allocate and use inspection resources, determine the focus of daily maintenance management, assist the enterprise to establish the integrity evaluation database through the project implementation, perfect relevant procedure documents and personnel training etc. to realize the storage tank group integrity management and long period safe operation.

6. Summary

In summary, we understand the basic methods of detection and evaluation of aviation kerosene tank based on risk. Through the research of the collection and integration of aviation kerosene tank data, the risk assessment of aviation kerosene tank, the integrity detection of aviation kerosene tank, the integrity assessment of aviation kerosene storage tank, we have a preliminary grasp of the detection and evaluation method of aviation kerosene storage tank based on risk, which is the key to solve the problem of aviation kerosene storage tank safety.

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