Research on Dry Replacement Method and Nitrogen Consumption Calculation for Large LNG Full Capacity Storage Tanks

Baohe Zhang*, Yuanjie Zhang, Bo Sun, Zuowei Li

LNG Engineering & Technology Branch, Offshore Oil Engineering Co., Ltd., Tianjin, China

Email address:

zhangbh7@cooec.com.cn (Baohe Zhang)

*Corresponding author

Abstract

In the backdrop of promoting the development of green energy and highlighting the construction of "ecological civilization" of China, the domestic liquefied natural gas industry has developed rapidly, and the business volume of LNG storage tanks has increased rapidly. The pressure test of the large LNG storage tank is performed by hydraulic pressure. In engineering, the method of continuous nitrogen blowing is often used for drying and replacement, which can result in high costs, high nitrogen consumption, and long construction periods. In addition, the imperfect theoretical calculation can also hinder the calculation of LNG tank drying and replacement. In order to reasonably save and accurately estimate the amount of nitrogen used for drying and replacement, two methods of LNG tank drying and replacement, continuous blowing and pressure expansion, were introduced and analyzed based on the actual project situation. At the same time, the influence of parameters such as oxygen content and dew point was considered, and a formula for calculating nitrogen usage was derived and relevant calculation software was developed. Comparative analysis with the specific construction situation on site showed that the comprehensive calculation method for drying and replacement obtained in this article can quickly and accurately calculate nitrogen usage and operation period, and guide the theoretical calculation and construction work related to LNG tank drying and replacement.

Keywords

LNG Storage Tank, Dry Replacement, Nitrogen Consumption