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INCREASED SECURITY OPERATION OF NUCLEAR FACILITIES BY USING REFRIGERATION SYSTEMS WITH ENVIRONMENTALLY FRIENDLY FREON

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Abstract

One of the basic conditions for the operation of nuclear installations is security operation. The complexity of the phenomena in heavy water detritiation plants, determine the use of advanced equipment for technological processes involved. Pilot Plant for Tritium and Deuterium Separation developed the cryogenic technology of tritium separation from tritiated heavy water. The process is based on an catalyzed isotopic exchange module, where the tritium is extracted from tritiated heavy water. An important process in this way is to extract moisture from the wet hydrogen gas coming from the exchange column. This process takes place on two phases: extracting moisture from the gas resulting from isotopic exchange column on the primary system consists of a fully automated chiller; cleaning systems on molecular sieve adsorbents.
The refrigeration system (chiller system) used Freon as refrigerant. Refrigerants are working fluid in any refrigeration system. They absorb heat from one source and send it to another source, usually through evaporation and condensation processes due to phase change. Chlorofluorocarbons - CFCs and hydrochlorofluorocarbons HCFCs were developed as a series of non-toxic refrigerants, stable (at normal temperatures) that belong to a larger family of substances known as halogens. These refrigerants contained, amongst other elements, like chlorine. Refrigerants known as CFC12 (R12) and HCFC22 (R22) are stable, remaining in the atmosphere for many years, and eventually diffuse into the stratosphere. In the upper atmosphere the molecules of refrigerants with chlorine can destroys the ozone layer. In the lower atmosphere the molecules absorbs infrared radiation and contribute to global warming.
Paper try to meet the safety of the operation requirements of nuclear facilities, technological performance of work required by the thermodynamic conditions but also environmental protection as an important factor in sustainable development of society.

Key words: environment protection, heat transfer, R407 refrigerant, refrigeration efficiency

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