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P3.186 Cryogenic distillation experimental stands for hydrogen isotopes separation

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In cryogenic distillation columns complex phenomena appear, some of them are needed and others must be avoided, such as the non-uniform cooling of the distillation column or the impossibility of transfer of the cooling power to the gas mixture with major changes in the separation dynamics. The loss of separation capacity or the inability to reach optimal operating parameters are caused by multiple factors starting with insufficient cryogenic power, heat losses from design/construction or from improper design/installation of the isolation systems, condenser with small heat transfer surface or cryogenic power, column misalignment and column internals not properly designed and installed, boiler affected by two-phase boiling and/or flow, feeding of the column with high flow and/or high temperature, improper position of the feeding and/or extraction points or improper packing. The paper presents new solutions for the design of several components, parts of the new experimental cryogenic distillation stands developed in the Cryogenic Laboratory in order to expand the experimental base for ICSI Rm. Valcea "Experimental Pilot Plant for Tritium and Deuterium Separation". One stand will allow testing and characterization of new solutions for cryogenic distillation columns at laboratory scale and will be attached to a hydrogen liquid liquefaction system while the second stand will allow testing of verified solutions at semi-industrial level and this will be attached to a Linde HRLS 11 refrigeration and liquefaction plant that has the capability to transfer in a closed loop helium gas at 16K-20K.

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