MECHANICAL DESIGN OF EXPERIMENTAL APPARATUS FOR FIREX CRYOTARGET COOLING

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Experiments of FIREX cryogenic targets have been conducted at cryogenic environment. The target is cooled by ambient GHe with precise temperature control at a low pressure. Vacuum sealing by metal gaskets, such as Helicoflex delta®(Garlock) and U-TIGHTSEAL® (Usui Kokusai Sangyo Kaisha. Ltd.), is applied, and its validity has been confirmed in our cryogenic apparatus[1]. To make the experimental condition stable, the vacuum structure must be rigid to ensure He leak tightness. However, it is disadvantage for an easy exchange of the target itself. No use of bolts or screws in a metal gasket seal system would be one solution to realize an easy target exchange. A loading system to the metal gasket might be substituted for them. We design and demonstrate a seal and loading system for cryogenic use.

Figure 1 shows the target can with a metal gasket loading system. The gasket is loaded at several thousand newton from room temperature. The loading strength is measured by a load cell. Its sealing performances are evaluated using a He leak detector. We conducted a preliminary measurement at room temperature. The helium leak rate was under ~1.0 x 10^{-10} Pa m^3/sec at ~3500 N of the sealing load. Systematic measurements of a helium leak rate on the sealing load will be conducted at room temperature and a cryogenic environment.

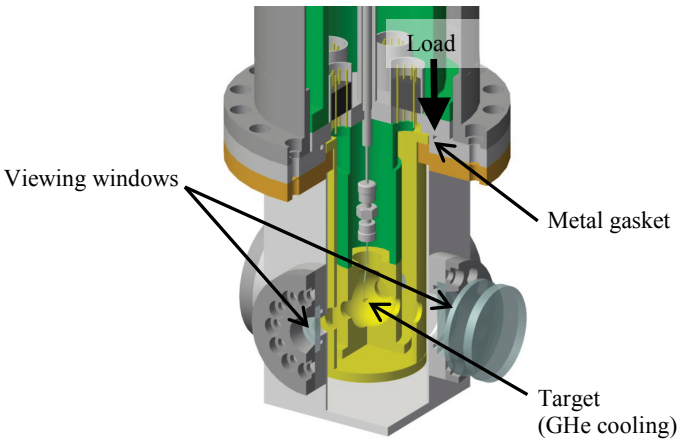

Figure 1 Target can with a metal gasket loading system. The loading strength is variable. The target holder can be removed easily.

[1] A. Iwamoto, et al., Fusion Eng. Des., 81(2006), 1647.