

DEVELOPMENT OF WELDED BELLOWS FOR THE KSTAR VACUUM VESSEL¹

N. I. Her, G. H. Kim, and J. S. Bak

Korea Basic Science Institute, 52 Yeo-eun-dong, Yuseong-gu, Daejeon, 305-333, Korea

T. K. Sung, T. Suenaga, M. Nagura, and K. Kobayash

VALQUA Seiki Ltd., 8-52, Honguhdoh Kawada, Shinshiro-shi, Aichi, Japan

hni@kbsi.re.kr

The vacuum vessel of the Korea Superconducting Tokamak Advanced Research (KSTAR) tokamak has 72 ports for diagnostics, plasma heating, vacuum pumping, baking, and cooling. The ports penetrate the cryostat wall with bellows to compensate displacements of the ports due to electro magnetic loads and thermal loads within the allowable limits. S-type welded bellows were designed with consideration of the port shape, the maximum displacement, and life cycle. Fatigue strength evaluation using Minor's rule was performed. Rectangular-shaped prototype bellows with outer dimensions of 1370 mm x 1610 mm were fabricated and tested. We confirmed that the bellows had sufficient fatigue strength and vacuum reliability. VALQUA fabricated the prototype bellows and main bellows. The fabricated bellows were assembled with the vacuum vessel ports and helium leak tested. The assembled port devices will be welded on the vacuum vessel body in accordance with the KSTAR tokamak assembly scenario.

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