

예민화 및 시효 열처리한 스테인리스강의 환경피로 특성

정일석[†] · 김상재* · 홍승열** (전력연구원)**Sensitization and Aging Effect on Environmental Fatigue of Stainless Steel**

Ill-Seok Jeong, Sang-Jai Kim and Sung-Yull Hong

Key Words: Dissolved Oxygen(용존산소), Fatigue Life(피로수명), Sensitization(예민화), Strain Rate(변형률 속도).

Abstract : Among published environmental fatigue test data of stainless steels, Type 304 SS, Type 316 SS, Type 316N SS, Type 316 Weld SS, and cast stainless steel CF8M in Japan and U.S., useful data were quoted for analyzing the effect of sensitizing stainless steels in LWR environments. Temperature of the test data was 288~325°C which is operating temperature range of LWR plants. Data were classified in terms of dissolved oxygen levels, strain rates in tension stroke, and sensitization. Then data were compared with logarithmic graph of vertical strain rate and horizontal fatigue life. Trend of sensitization and aging effect was investigated for each type of stainless steels.

Zr-2.5Nb 합금에서 랜칭 열처리 효과

김상재[†] · 정일석(전력연구원) · 임경수* · 김영석** (한국원자력연구소)**Effect of Ratcheting Heat Treatment in Zr-2.5Nb Alloy**

Sang-Jai Kim, Kyung-Soo Im and Young-Suk Kim

Key Words: Cantilever Beam Specimen(CB 시험편), Delayed Hydride Cracking(수소지연파괴), Zr-2.5Nb alloy(Zr-2.5Nb 합금).

Abstract : The aim of this study was to obtain a better understanding of delayed hydride cracking (DHC) of Zr-2.5Nb pressure tube with hydrogen concentration. DHC tests were conducted at 150, 200 and 250 °C on cantilever beam specimens with 60 and 80ppm H, respectively. The threshold stress intensity factor, K_{IH} in radial direction of the Zr-2.5Nb tube were determined with and without the ratcheting heat treatment. Ratcheting heat treatment specimens had a little high K_{IH} value from most temperature range. At the hydrogen concentration of 80 ppm, K_{IH} for the Zr-2.5Nb tube was 13 MPam^{1/2} with the ratcheting heat treatment. However, with the hydrogen concentration decreasing to 60ppm, K_{IH} increased unexpectedly to a higher value at 250 °C. Based on the results, K_{IH} for Zr-2.5Nb tube is discussed with a supersaturated concentration of hydrogen.