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**Deformation and Stresses generated on a Bolted Flange Joint Assembly and Grayloc® Clamp Connector at Elevated Temperatures**


# Abstract

Finite element analyses were performed to investigate the leakage and structural integrity of the bolted flange joint assembly (BFJA) and Grayloc® clamp connector (GCC), when each assembly was subjected to the external loads of bolt preload, internal pressure and thermal loadings. The thermal loadings were of both spatially-uniform and spatially-nonuniform temperatures on the assemblies. The initial bolt preload applied on the BFJA and the GCC was 60,000 N and 6,000 N, respectively. The internal pressure for both assemblies was 27 MPa. The BFJA was found to have satisfactory leakage and structural performance for the thermal loadings expected on the low-temperature (260°C) side of the Carleton Supercritical Water (CSCW) loop. The GCC was found to have satisfactory leakage and structural performance for the thermal loadings expected on the high-temperature (600°C) side of the CSCW loop. The leakage integrity of the GCC was found to remain intact for a temperature difference of 15°C between the inner and outer surfaces of the flange. This was not the case for a temperature difference of 100°C.