

Liu, M., Wang, Y.-Y., Zhang, F., Wu, X., and Nanney, S., Refined Compressive Strain Capacity Models, Proceedings of 6th Pipeline Technology Conference, Belgium, 2013, Paper no. S15-01

Abstract

At least two limit states are associated with strain-based design and assessment: tensile rupture and compressive buckling. The limit strains of compressive buckling (compressive strain capacity) may be obtained from various models, usually in the form of parametric equations. The basis of these models can be experimental test data, analytical models, and/or numerical models. This paper presents refined compressive strain capacity models developed under a project sponsored by the U. S. Department of Transportation. The refined models incorporate key parameters affecting compressive strain capacities, including D/t ratio, internal pressure, geometry imperfection, pipe Y/T ratio, uniform strain and Luder's strain. The models also provide improved assessment for the effect of girth welds on the compressive strain capacity. The new models have greater range of applicability than most existing models. The refined models are evaluated with public-domain experimental data. Improved balance on the conservatism and accuracy are observed.

Keywords

Pipeline, Strain-based design and assessment, Compressive strain capacity models