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Comparative Analysis on Buckling Behavior of Steel Cylindrical Tanks by Consideration of More Realistic Numerical Models

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Abstract **-** Liquid storage steel tanks are vertical above-ground cylindrical shells and as typical thin-walled structures, they are very sensitive to buckling under external pressures, especially when they are empty or at low liquid level. In this paper the results of numerical investigations on the effects of spiral stairway on the buckling behavior of steel cylindrical tanks subjected to external pressures are presented. Furthermore, a numerical study is performed to investigate the effects of internal corrosion on the buckling behavior of ground based steel cylindrical liquid storage tanks, subjected to both wind and vacuum pressures. It is concluded that the spiral stairway acts as an oblique stiffener on the tank wall. Contrary to the case of wind loading, the stairway has negligible effect on buckling resistance of tanks under vacuum pressure. In addition, it is found that the buckling load is markedly reduced with thinning of the shell for upper part corrosion cases, irrespective of the loading condition.

Keywords**:** Buckling; Corrosion; Numerical investigation; Spiral stairway; Steel cylindrical tanks; Vacuum pressure; Wind pressure