

## WIND INDUCED FATIGUE IN TUBULAR STEEL WIND TURBINE TOWER WELDED JOINTS

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### ABSTRACT

The constantly increasing need for sustainable energy production, leads to the construction of taller tubular steel wind turbine towers, which are the commonest tower configuration. Recent catastrophic tower accidents, due to fatigue loading, challenge the engineering community towards more durable structures with minimized material consumption. The towers are designed to withstand a complex loading field; but cases of recent tower collapses happening in normal wind conditions and with shell stresses still in the elastic range, highlight the importance of fatigue phenomena and their consequences on the tower joints. The fabrication and mounting procedures applied for the construction of tubular steel wind turbine towers need the realization of four types of welded joints. The four types of welded joints are: the circumferential welds between the subsequent tower parts, the longitudinal welds between the tower parts, the circumferential welds between the shell and the stiffening rings and the circumferential welds between the tower shell and the bottom flange. In order to assess the efficiency of such connections towards fatigue loading, two towers of identical height and variable shell thickness are compared. The calculation methodology applied is the damage accumulation method used for the fatigue life calculation of the structure, and important results on the importance of the tower joints on the overall tower behavior are derived.

### REFERENCES

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