

## The effect of EPS treatment on hydrogen embrittlement sensitivity of QStE700TM steel

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**Abstract:** In this paper, slow strain rate tension (SSRT) and double electrolytic cell electrochemical hydrogen permeation were employed to study the effects of Eco Picked Surface (EPS), picking and blasting on the hydrogen embrittlement (HE) susceptibility and hydrogen permeation kinetic parameters of QStE700TM high-strength structural steel. The influence mechanism of EPS technology on the HE susceptibility of QStE700TM steel was discussed by combining the oxide scale residue, hardness and residual stress on the surface of steel plate with different treatment technology. The results showed that the HE susceptibility of QStE700TM steel treated by EPS technology was only 8.1 %, 12.7 % and 20.5 % lower than that of pickling and blasting, respectively. It would be related to the less residual oxide scale and the residual compressive stress on the surface of the steel plate treated by EPS. In addition, smaller hydrogen diffusion flux ( $J_{\infty}L$ ) and effective hydrogen diffusion coefficient ( $D_{app}$ ) and larger lag time ( $t_L$ ) and cathode side subsurface hydrogen concentration ( $c_0$ ), should be responsible for the lower HE susceptibility of the steel samples treated by EPS. Take all factors into account, the EPS is a new, reliable, low-carbon and environmental friendly surface descaling technology for high-strength steel.

**Keywords:** QStE700TM steel; EPS treatment; hydrogen embrittlement susceptibility

### Reference

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