

## TRANSFORMATION RULES ON ENGINEERING STRESS STRAIN CURVES OF S690 FUNNEL-SHAPED COUPONS

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**Abstract.** *Funnel-shaped coupons are widely adopted for various steels low cycle high strain cyclic tests to investigate hysteretic behaviour of structural steels under cyclic actions in order to avoid plastic axial buckling. However, a technical problem is induced that the engineering stress strain curves obtained from these funnel-shaped coupons are not comparable to those curves obtained from standard cylindrical coupons. Hence, it is essential to correlate the engineering stress-strain characteristics obtained from monotonic tensile tests using these two types of coupons. This paper presents a theoretical study into such a correlation on the stress strain characteristics between the funnel-shaped coupons and the standard cylindrical coupons. A series of transformation formulae are proposed for various deformation ranges, namely i) Elastic range; ii) Plateau range; iii) Hardening range and iv) Necking range. The proposed transformation formulae have been calibrated with tensile test results and FE models of the S690 funnel-shaped coupons. These test results provide strong evidence to the effectiveness of the proposed transformation rules for subsequent investigations into hysteretic behaviour of steel materials.*

**Keywords:** *Tensile tests, funnel-shaped coupons, S690 steels, stress-strain characteristics;*