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PROCEEDINGS

Correlations of mechanical properties by SPT and conventional tensile test for stainless steel 316L

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The Small Punch Test (SPT) method is an “almost non-destructive”[1] method by uses miniaturized samples to obtain mechanical properties of materials. It was development by nuclear industry to analyses mechanical behavior of irradiated materials principally by small volume of the samples, which facilitates their storage and handling. Its applications are spreading across several areas of materials engineering, for use in situations where conventional methods do not apply. SPT consists of pressing a sphere, with a diameter equal to 2.5 mm, in a miniaturized sample of circular geometry (diameter $d = 8$ mm and thickness about 0.5 mm)[2], which has fixed edges, tested in conventional mechanical testing machines with the aid of a device developed for their achievement.

In this work, mechanical properties of stainless steel (316 L) were abstained by two different methods: conventional tensile test and the small punch test (SPT), for comparing the results and allow the evaluation of the method. The SPT results depends on graph interpretations and discussions take place at now. Correlations of results guide us in choosing the most appropriated method for interpreting the force x displacement graph from SPT.

[1] M. F. Moreno, “Effects of thickness specimen on the evaluation of relationship between tensile properties and small punch testing parameters in metallic materials”, Materials and Design, vol. 157, pp. 512-522 (2018).

[2] ASTM E3205-20 Standard Test Method for Small Punch Testing of Metallic Materials, Annual Book of ASTM Standards, Part 03.01, ASTM International (2020).