Contribution ID: **344** Type: **Keynote Presentation**

# Performance of a HSLA steel produced via EAF and ESP® process route for the service in gaseous hydrogen

*Wednesday 8 October 2025 12:30 (20 minutes)*

Acciaieria Arvedi, with its ISP® and ESP® plants, produces flat rolled carbon steels certified carbon neutral from EAF steelmaking and thin slab continuous casting with direct rolling starting from recycled materials. The steels are produced for many different end-uses including stamping and deep-drawing for the automotive industry, building and structural applications, pipes for water, energy and oil & gas sectors. To extend its product portfolio, the Arvedi Group has shown interest in the hydrogen pipeline sector. For this purpose, a HSLA steel of the X46 grade has been casted and hot rolled via EAF steelmaking and ESP® process route followed by tube forming, HFW welding and seam annealing at Arvedi Tubi Acciaio. The material has then been fully characterized to meet firstly the requirements of the API 5L PSL2 standard for the sour service in the oil & gas transportation sector and secondly according to the ASME B31.12 standard for the hydrogen piping and pipelines including Hydrogen Induced Cracking (HIC) tests and KIH tests in a hydrogen environment. In addition, Slow Strain Rate (SSR) tests in a 100% hydrogen atmosphere and 1000 hours as exposure time have also been performed. As a result of the experimental activities, it has been demonstrated that the X46 HFW pipe produced via EAF and ESP® process route is suitable for the service in gaseous hydrogen.

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**Session Classification:** Special Applications & Performance

**Track Classification:** Steel materials and their application