

HYDROGEN MATERIAL COMPATIBILITY, OVERVIEW AND POTENTIAL PATHS FORWARD.

EA-610, EG-823

APPROACHES FOR DEMONSTRATING HYDROGEN COMPATIBILITY OF METALLIC MATERIALS.

- **White list approach:** Predefined material list with acceptable pressure range and material composition (e.g. SAE J2579)
- **Performance-based approach:** Proof of hydrogen material compatibility via H₂ cycles with the geometry of the component (e.g. for the container in EC79, SAE J2579, ISO 19887)
- **Material tests on test samples (e.g. notched and unnotched):**
 - SSRT (slow strain rate test) and FTL (fatigue life test) as proposed by from SAE in GTR 13 phase 2 (was not implemented due to the unavailability of testing institutes in particular for FTL).
 - ISO 11114-4: including burst disc test
- **Additional requirements (e.g. chemical composition, mechanical properties):**
 - Defined chemical composition, e.g. nickel-equivalent of at least 28.5% and mechanical properties, e.g. fracture constriction of 75% as in Japanese regulation

There are various approaches for demonstrating hydrogen material compatibility. These include the white list approach, the performance-based approach, tests on test specimens and additional requirements such as nickel/content.

POTENTIAL WAYS FORWARD TO REGULATE HYDROGEN MATERIAL COMPATIBILITY.

- Update on the availability of test centers in Europe.
- Establishment of a material white list (maybe with a date of expiration).
- Address the need for such a test to standardization committee, e.g. ISO, SAE.
- Make a proposal for a performance based test with a rationale for the selected number of hydrogen cycles (various attempts in ISO, SAE).
- Other proposals?