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ELECTROLIFE

Enhance knowledge on comprehensive electrolysers technologies degradation through modeling, testing and lifetime prevision, toward industrial implementation



Deliverable report

D5.1 - Specifications of the testing tools

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Executive summary

Scope of this document is to give description, specifications and requirements of the **Testing tools** (or '**Test benches**') to be provided for ELECTROLIFE project. Furthermore, some specifications and requirements are given in this document also for the stacks to be tested and for the laboratories, in order to ensure compatibility with the test benches, feasibility of operation, data transmission and safety.

The aim of the test benches is to allow performance and degradation tests on electrolysis stacks, in the laboratories of the RTOs (Research and Technology Organizations) partners of the project, collecting, analyzing and transmitting data to a cloud data platform (owned by the partner Volytica, developer of diagnostic tools).

Stacks of five different technologies will be provided by different stack manufacturers, partners of the project. The stacks will be tested in five different laboratories, owned by five different RTOs, partners of the Project.

Therefore five test benches have to be provided, one for each of the electrolyser stacks to be tested, which will be based on the different technologies: PEMEL, AEL, AEMEL, SOEL, PCCEL.

The partners involved are represented in the scheme below.

Test bench Provider	LOCCIONI	LOCCIONI	LOCCIONI	LOCCIONI	LOCCIONI
Laboratory	JÜLICH Forschungszentrum	FAU FRIEDRICH-ALEXANDER UNIVERSITÄT ERLANGEN-NÜRNBERG	Politecnico di Torino	TU Graz	Politecnico di Torino
Stack manufacturer	1s1 Energy	stargate hydrogen	Pietro Fiorentini	SolydEra	KERIONICS
	PEM	AEL	AEMEL	SOEL	PCCEL

Figure 1. ELECTROLIFE partners directly involved in stack testing

Specific requirements for each test bench are given in chapter 2.1.

Further general requirements, common/valid to all the five test benches, are provided in chapter 2.2.

Specifications and requirements of the laboratories and activities expected from RTOs (related to test benches) are provided in chapter 4.

Specifications and requirements of the stacks to be tested are provided in chapter 5 and attachments:

- [1] PEMEL stack specifications;
- [2] AEL stack specifications;
- [3] AEMEL stack specifications;
- [4] SOEL stack specifications;

[5] PCCEL stack specifications.

Some specifications and requirements of diagnostic tools (only for data transmission and access) are given in chapter 6.

Requirements and specifications in this document have been collected by EGP from the partners most involved in each specific topic, and have been shared with all the partners for comments/suggestions, review and approval.

Requirements provided in this document (and attachments) have to be considered mandatory but not exhaustive, each activity shall be carried out by its owner in compliance to state of the art of each applicable field, current and applicable regulations and laws, considering technical and safety issues:

- the Provider (of testing tools) will be responsible for the test benches and all the activities related to design manufacturing and supply;
- the stack manufacturer will be responsible for the stacks and all the activities related to design manufacturing and supply;
- the RTOs will be responsible for all activities in laboratories, including operation of test benches, stacks testing, safety.

If some specifications are not consistent, the partners shall notify and evaluate with the other partners how to proceed. As general rule, the more precautionary / demanding specification has to be considered.

If some changes to the specifications in this document are useful or necessary, the partner has to highlight and to agree with the other partners involved, sharing the outcomes with the other partners. In case of relevant modifications, a revision of this document shall be delivered, highlighting changes.

The requirements and specifications in the document will allow the project partners to work consistently, each one in its own scope (AEA regarding testing tools manufacturing, RTOs regarding laboratory preparation, technology developers regarding stack manufactory, Volytica for data transmission), improving the effectiveness of the project, reducing the possibility of issues and subsequent slowdown.

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Project partners:

#	Partner short name	Partner Full Name
1	POLITO	Politecnico di Torino
2	UNR	Uniresearch B.V.
3	EGP	Enel Green Power SpA
4	FAU	Friedrich-Alexander-Universitaet Erlangen-Nuernberg
5	TUG	Graz University of Technology
6	KER	Kerionics s.l.
7	AAU	Aalborg University
8	FZJ	Forschungszentrum Jülich gmbh
9	ULille	University of Lille
10	STARGATE	Stargate Hydrogen Solutions OU
11	PF	Pietro Fiorentini s.p.a.
11.1	HYT	Hyter s.r.l. (Affiliated)
12	CNR	Consiglio Nazionale delle Ricerche
13	1s1	1s1 Energy Portugal Unipessoal Lda
14	AEA	AEA s.r.l.
15	VDX	Volytica diagnostics GmbH
16	SE	SolydEra SpA

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