Test plan

TSRT10, Project Group 7

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Version 1

Status

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DOCUMENT HISTORY

Version	Date	Changes made	Sign	Reviewer
0.1	2022-10-10	First draft	AB	2022-10-10
0.2	2022-10-12	Final draft	AB	

1 INTRODUCTION

In this document the test plan for the project is presented. The test plan defines the tests that have to be performed in order to ensure that all requirements defined in the Requirement Specification, which was agreed upon at BP2, are fulfilled. This is done by declaring a number of tests that will be executed throughout the project, testing all subsystems and the system as a whole.

In Chapter 2, it is described which requirement is concerned and how to proceed to verify the purpose and the execution of the test.

1.1 Test template

The template described in Table 1 should be used to set up all the tests and later filled in for the respective test after the test is carried out. Lines one to seven must therefore be filled in before the test and lines 8-9 must be filled in after the test.

Table 1: *Test template*

Test number:	-
Goal:	-
Requirement number:	-
Test description:	-
Responsible person:	-
Deadline (week):	-
Criteria:	-
Result:	-
Comment:	-
Approved by:	-

1.2 Test status

The test results will, after execution, be available in a Test Protocol. The test protocol is further presented in Section 1.6. If the test is completed it will receive a grade of *Passed*. It is possible that the tested task is completed but not in a satisfactory way which needs to be adjusted for. The test can therefore receive a grade of *Passed with complementary work*. If the performed task can not be accomplished within the given trials, a *Failed* grade will be set. If a failed grade is set for some test, the test needs to be redone completely after revision. If the grade *Passed with complementary work* is given, a general description of the problem will be made in the test protocol. This can subsequently be discussed with project orderer whether it needs to be revised or not.

1.3 Failed test

In the event of a failed test, various measures must be applied to ensure that the specified requirement is fulfilled. It may be appropriate to either redo the test or to renegotiate specific requirement with the consumer and have a new test done if the discovered problem will not be able to be solved within the specified time horizon.

1.4 Requirements without testing

Some of the requirements in the requirements specification can be verified without a detailed testing. Table 2 shows the requirements that are considered too trivial for a detailed test plan.

Table 2: *Requirements without testing*

Requirement number	Type	Description
1, 2, 21	General	Comparisons and evaluations
5	Interface	Monitoring
11	Design	Dimensional analysis
14, 17, 26	Functional	Sensitivity analysis, comparisons and investigations
31	Development	Discussion
32, 33	Reliability	Collection of data and general assumptions
34	Economy	Total time spent on project

1.5 Testing responsibilities

The group's test manager has overall responsibility for the tests. The execution of the tests and subsequent analysis of test protocols will be divided among the team members. Modification of test must be brought to the attention of the group before realization and execution.

1.6 Test structure

A general description of the test protocol layout is shown below. In addition to the test results, a list describing problems with tests rated as *Passed with complementary work* will also be presented.

Table 3: *A template showing the structure of the test protocol. The test results will be presented in a separate Test Protocol document*

Test no.	Requirement Tested	Date	Test Responsible	Status
1	Req. no tested	Date of exe.	Responsible project member(s)	Test Grade
2	...	...	...	...

2 TESTS

In this section the planned tests are presented. Only requirements with priority **Base** are specified. The structure will be as follows:

- Interface requirement tests
- Design requirement tests
- Functional requirement tests
- Performance requirement tests

2.1 Tests of interface requirements

In this section interface tests are presented.

Test no.	Requirement Tested	Date [Week]	Description
1	4	44	Multiple scenarios with different activities related to the electricity consumption of the single house should be selected and the simulation should be run to evaluate the adjustment possibility.

2.2 Tests of design requirements

In this section design tests are presented.

Test no.	Requirement Tested	Date [Week]	Description
2	8	43	The accumulator tank with heat pump model should be simulated and investigated individually. The model should also be tested as part of the low-voltage grid.
3	9	43	The stationary battery model should be simulated and investigated.
4	10	43	The thermodynamic house model should be simulated and investigated.
5	12	43	The water usage in household model should be simulated and investigated individually. The model should also be tested as part of the low-voltage grid.
6	13	43	The EV battery model should be simulated and investigated individually. The model should also be tested as part of the low-voltage grid.

2.3 Tests of functional requirements

In this section functional tests are presented.

Test no.	Requirement Tested	Date [Week]	Description
7	15	43	The real time optimization should be run individually for an electrical vehicle battery model and multiple, both simple and more complex, cases should be tested to evaluate the quality of the optimization algorithm.
8	16	45	The real time optimization should be run individually for a hot water accumulation tank and heat pump. Multiple, both simple and more complex, cases should be tested to evaluate the quality of the optimization algorithm.
9	25	46	A test, where single house data should be run first to evaluate the detection of acceptable voltage range, preferably in figure form. Secondly, the full scale test of the code should be run to investigate the detection of acceptable voltage range in the low-voltage grid simulation.

2.4 Tests of performance requirements

In this section performance tests are presented.

Test no.	Requirement Tested	Date [Week]	Description
10	28	44	Test where algorithm takes in different data files provided by Tekniska Verken should be done and evaluated.
11	29	46	Multiple historic data files of energy consumption, both simple and more complex, should be simulated to test and evaluate the quality of the prediction algorithm.