

The prequalification process and technical requirements of Automatic Frequency Restoration Reserves (aFRR) Service

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Table of Contents

1	Introduction	2
2	Reserve Unit Prequalification	2
2.1	Prequalification process	2
2.2	Necessary documentation	4
2.3	Validity period of prequalification test	4
3	Technical requirements for the service provider	5
3.1	Activation signal process	5
3.2	Real-time data exchange.....	5
3.3	Activation speed.....	5
3.4	aFRR service accuracy	6
3.5	LER aFRR provider energy reservoir management requirements	6
4	Prequalification test.....	6

1 Introduction

This document describes:

- Prequalification process of Reserve Units that will be used to provide Automatic Frequency Restoration Reserve (aFRR)
- Verification of compliance with the technical requirements concerning Reserve Units in accordance with articles 158 and 159 of the Guideline on System Operation, Commission Regulation (EU) 2017/1485.

2 Reserve Unit Prequalification

2.1 Prequalification process

Balancing Service Provider is responsible for carrying out the prequalification tests in accordance with paragraph 4 of this document and for delivering the required information in accordance with paragraph 2.2.

The process illustrated in Figure 1 is followed in the prequalification of a Reserve Unit.

1. The Balancing Service Provider will notify Transmission System Operator about the wish to prequalify a Reserve Unit at least 2 weeks before prequalification testing by providing one or more alternative testing times.
2. After notification, Transmission System Operator will review the testing plan and will assess the testing plan within the 2 weeks.
3. If testing plan is approved, the Balancing Service Provider can proceed with the Reserve Unit prequalification test. Transmission System Operator has the right to send its representative to the prequalification tests. Balancing Service Provider is responsible for the costs caused by the carrying out of the tests and Transmission System Operator only for its own personnel costs. Balancing Service Provider can cancel the pre-qualification test up to 1 hour before the test. If Balancing Service Provider has cancelled all agreed testing times, then the Balancing Service provider has to start the process again from step 1. If not agreed differently.
4. After prequalification test, Balancing Service Provider will share the test results with Transmission System Operator
5. Transmission System Operator will verify that all necessary documentation are provided within 8 weeks. However, both parties work as expedient as possible in good faith.
6. If additional data is needed Balancing Service Provider will be notified and will have 4 weeks to provide missing information.
7. Transmission System Operator will analyze the prequalification test data no later than 3 months. If all necessary documentation is provided and results fulfill the requirements, set in this document, the Reserve Unit is accepted and Transmission System Operator will inform Balancing Service Provider of the result of the prequalification process. If the requirements are not fulfilled, a correction request is sent to the Balancing Service Provider, who has to carry out the necessary corrections or the Reserve Unit is not accepted.

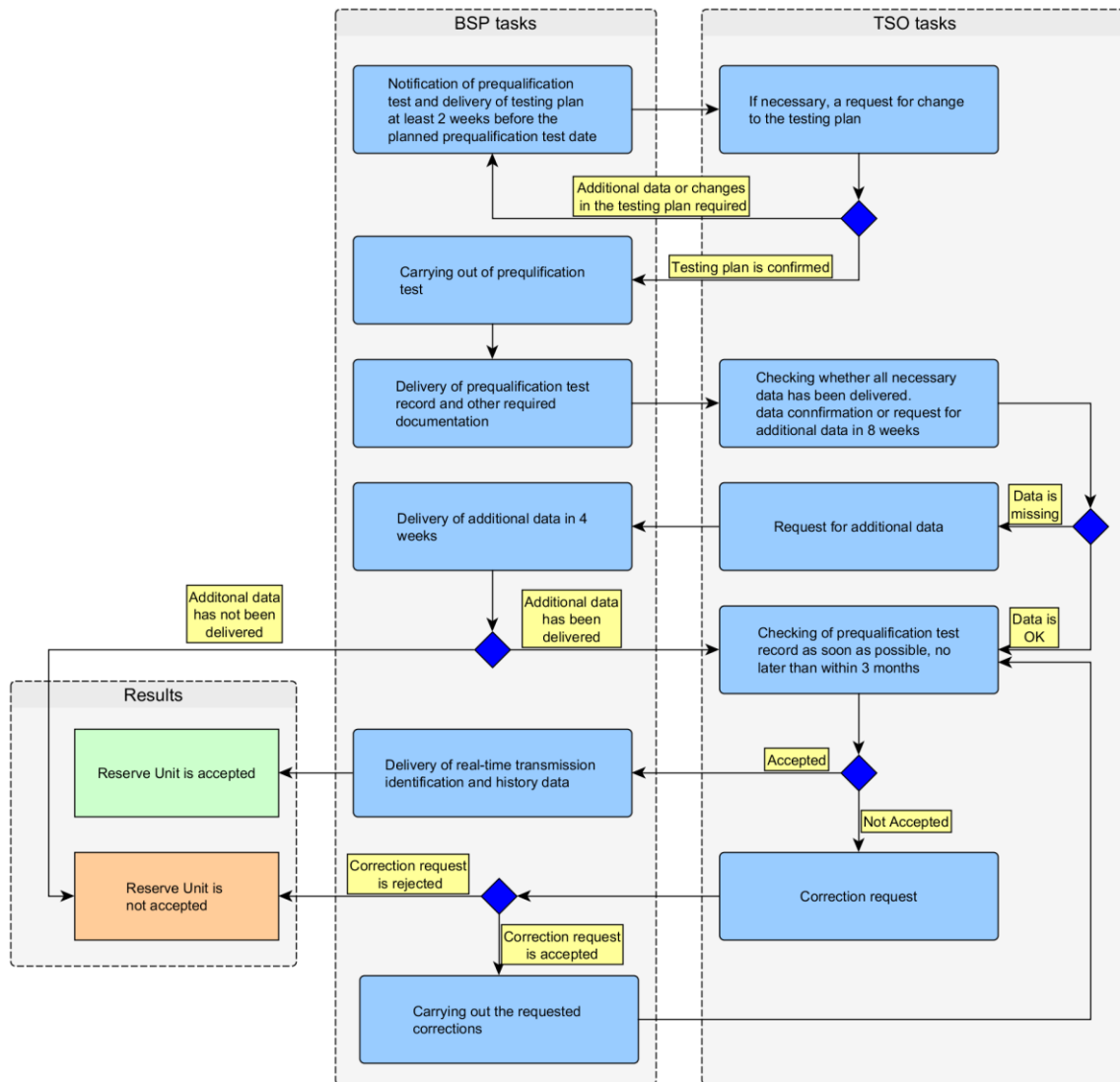


Figure 1. Prequalification process

2.2 Necessary documentation

In the notification to Transmission System Operator the Balancing Service Provider will provide:

1. maximum ΔP_{up} FRR value to be tested ;
2. maximum ΔP_{down} FRR value to be tested;
3. initial testing plan for the Reserve Unit or Resource;
4. information about control systems connection standard;
5. if applicable, additional clarifications and description of the working states in which Reserve Unit can provide the specified FRR values.
6. EIC of the Reserve Unit
7. EIC of the Balancing Service Provider
8. Contact details of test responsible
9. Applicable only for Limited Energy Reservoir (hereinafter referred to as LER) aFRR units, comprehensive description of energy reservoir management (hereinafter referred to as ERM) of LER aFRR unit and technical details of the energy reservoir.

The Balancing Service Provider will document and deliver the results of the prequalification test to Transmission System Operator electronically according to the Transmission System Operator document "Technical principles and solutions for TSO electrical installations"¹.

Balancing Service Provider is responsible for providing following test records:

1. Time-stamped scheduled active power output of all services of Reserve Unit;
2. Time-stamped instantaneous aFRR active power for:
 - a. Each aFRR providing unit,
 - b. Each aFRR providing group, and
 - c. each power generating module or demand unit of a aFRR providing group with a maximum active power output larger than or equal to 1,5 MW.
3. Time-stamped instantaneous total active power for:
 - a. Each aFRR providing unit,
 - b. Each aFRR providing group, and
 - c. each power generating module or demand unit of a aFRR providing group with a maximum active power output larger than or equal to 1,5 MW.

The data resolution must be equal or lower than 10s.

In case of a Reserve Unit prequalification renewal, only the prequalification test record and any changed information needs to be delivered.

2.3 Validity period of prequalification test

The validity period of prequalification test is 5 years. A prequalification test shall be renewed before the ending of the validity period. A prequalification test shall also be renewed whenever changes influencing control capability are carried out on the Reserve Unit.

New prequalification is necessary to increase the maximum aFRR capacity (both Up and Down direction) of a Reserve Unit. Changes in composition of units participating in a Reserve Unit do not automatically trigger new prequalification if the previous technical capability is maintained.

¹ [Kliendi tootmismooduli katsetamiste ja katsekava koostamise nõuded](#)

3 Technical requirements for the service provider

3.1 Activation signal process

The power required to restore the frequency of the power system is calculated at requesting TSOs' operation control system or in a centralized system covering multiple TSO-s, from where an activation request is sent to connecting TSO. Connecting TSO forwards the activation request to the Balancing Service Providers. Activation signal process is following:

1. Connecting TSO sends the activation signal to the Balancing Service Providers every 4 to 10 seconds.
2. The sign of the activation signal sent is negative, if the activation request is for downward balancing
3. The sign of the activation signal sent is positive, if the activation request is for upward balancing.
4. Connecting TSO sends the activation signal to Balancing Service Providers located in reserve providing region based on the aFRR market bid activation procedure.
5. The activation signal is sent from connecting TSOs' operation control system to Balancing Service Provider who forwards the signal to the Reserve Unit that maintains the reserve. A Reserve Unit can consist of one or more reserve resources.
6. Balancing Service Provider returns a feedback signal corresponding to the activated amount to connecting TSOs' operation control system as soon as possible after receiving the activation signal.

3.2 Real-time data exchange

Balancing Service Provider shall deliver unit-specific data to Transmission System Operator control system (SCADA):

1. aFRR capacity up (MW), that was sold to the aFRR market for current MTU
2. aFRR capacity down (MW), that was sold to the aFRR market for current MTU
3. Real-time power caused by the activation of aFRR. (The current activated amount of reserves)
4. Return sending of the activation signal sent by TSO. (The current set-point value)
5. State of charge level for LER aFRR providers.

System Operator sends form its SCADA system to Balance Service Provider control system:

1. aFRR activation signal in MW (The current set-point value)

The sending cycle of the information shall be at least 10 seconds. TSO monitors the maintaining and activation of the reserve on the basis of the real-time information. The activation signal, and return signals shall be at least with accuracy 0,1 MW.

3.3 Activation speed

A Reserve Unit contributing to the maintaining of the Automatic Frequency Restoration Reserve shall fully activate the reserve capacity in its entirety within 5 minutes from the sending of the activation signal. The activation shall start no later than 30 seconds from the sending of the activation signal.²

² Informative – There is no requirement to wait before starting ramping. This delay is designed to facilitate possible technical restrictions at a Reserve Unit. The recommendation is to start the ramping as soon as possible and use either a fixed ramp rate or dynamic ramp rate while ensuring minimum ramping speed.

The minimum activation ramping speed is shown on Figure 2. Actual activation of the Reserve Unit has to be above the minimum activation ramping rate. There is no limit for maximum ramping speed.

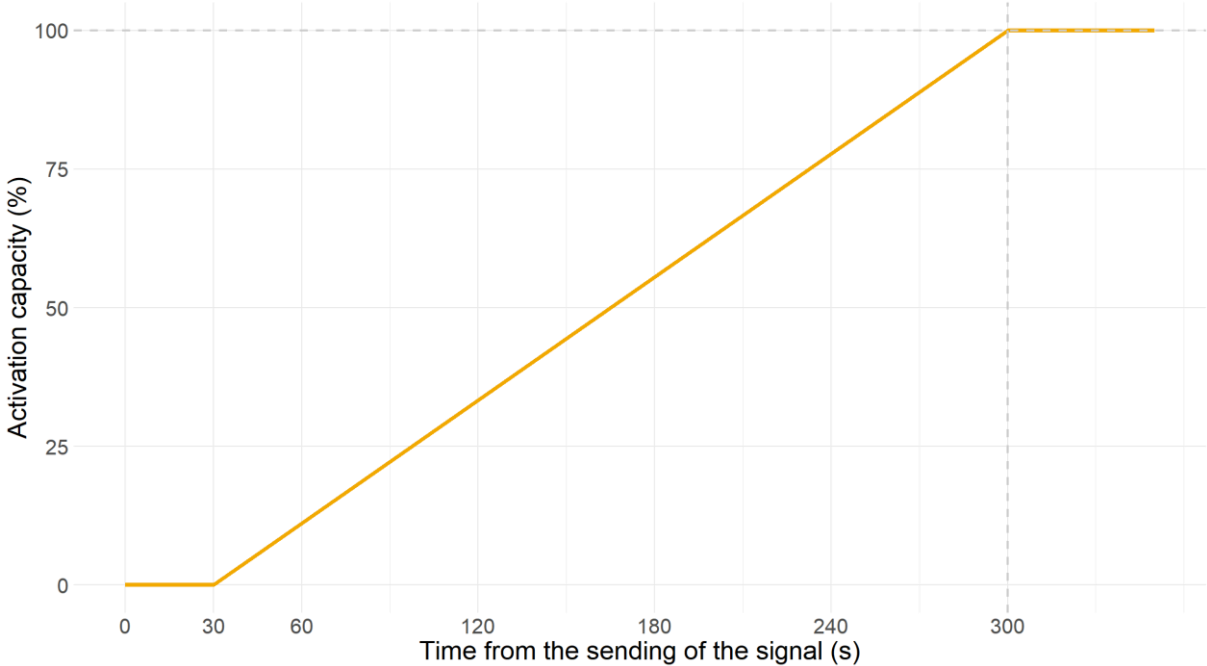


Figure 2. Minimum activation speed

3.4 aFRR service accuracy

A potential aFRR providing unit or group of units shall be capable of controlling its active power to a set-point value with a steady-state error not greater than $\pm 10\%$ of the aFRR capacity or 0,1 MW, whichever is larger.

The resolution of the signal used by the aFRR providing unit to define the quantity of aFRR to be activated shall be at least 0,1 MW.

3.5 LER aFRR provider energy reservoir management requirements

Each LER aFRR provider shall provide a comprehensive description of the active ERM of the LER aFRR provision by providing information on the following points:

1. Full capacity of energy reservoir;
2. Operational limits that affect usage of reservoir;
3. Operable capacity of reservoir;
4. Permissible charge/discharge power;
5. Description of planned ERM strategy (energy source used for management);
6. Information on the rate of use of ERM (continuous, each 5 min, etc.);
7. Expected bid regularity and size.

4 Prequalification test

Balancing Service Provider shall make sure that a Reserve Unit that contributes to the maintaining of the Automatic Frequency Restoration Reserve fulfils the requirements laid down in this document. The fulfilment of the requirements shall be verified by means of prequalification tests that shall be carried out in a normal operating situation of the Reserve

Unit. The requirements and guidelines given in this document shall be followed in the execution of the prequalification tests.

Balancing Service Provider determines the maximum values to be tested for upward and downward balancing as ΔP_{up} and ΔP_{down} accordingly. Transmission System Operator sends activation signals according to the test sequence, example provided in Table 1.

The Reserve Unit tested during the sequence shall fulfil the requirements described under paragraph 3.

Table 1. Prequalification test sequence

Time (min)	Change in set value (% of ΔP)
-5	Start of the test (system and measuring are active)
0	Set value at 100% ΔP up
5	Hold value
10	Set value at 50% ΔP up
15	Return to reference P
20	Set value at 100% ΔP down
25	Hold value
30	Set value at 50% ΔP down
35	Return to reference P
40	End of the test

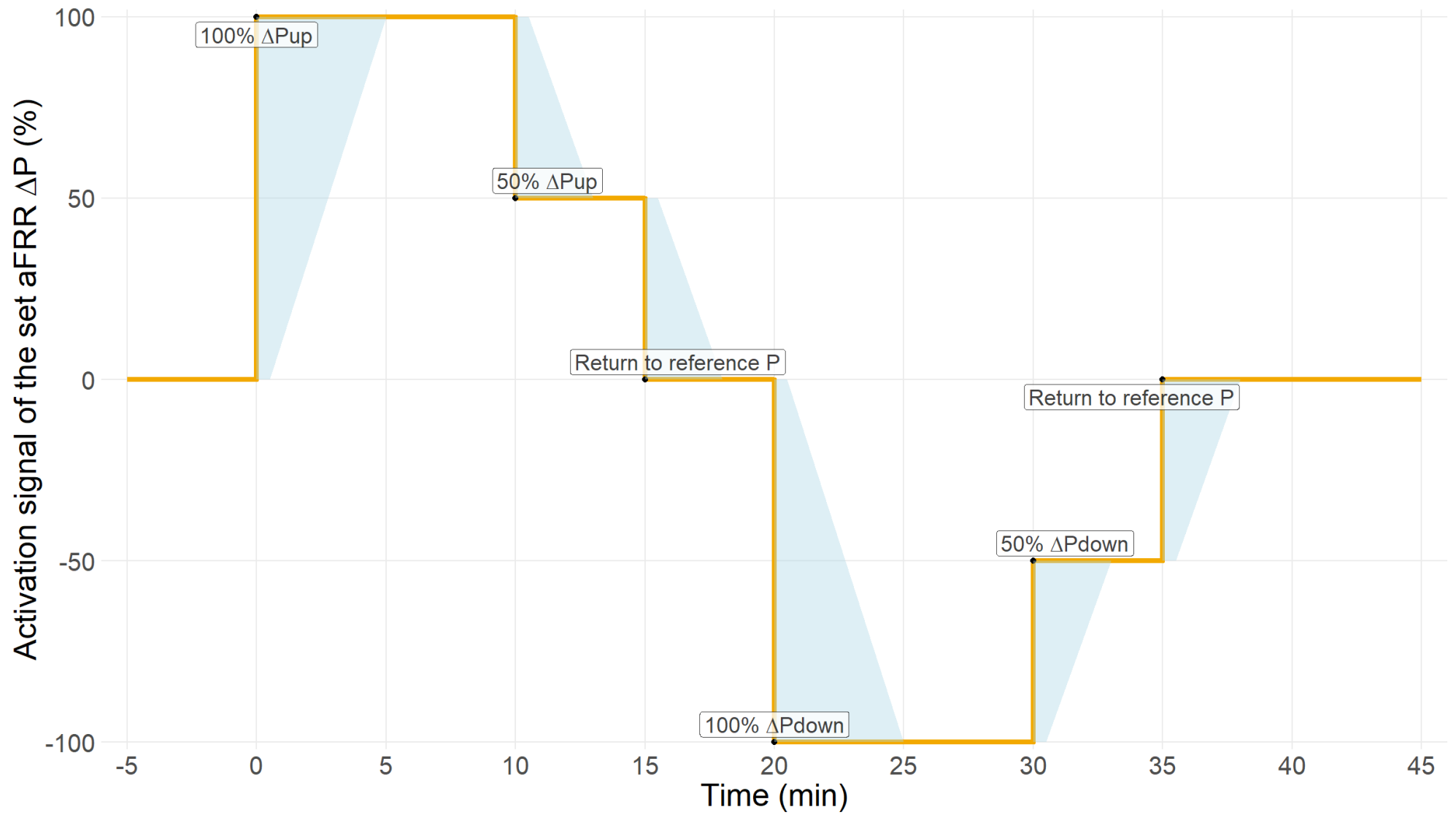


Figure 3. Prequalification test sequence