HNS[3000-10000]TL:
HNS3000TL, HNS3600TL-1, HNS3600TL, HNS4000TL, HNS5000TL, HNS6000TL, HNS7000TL, HNS8000TL, HNS9000TL, HNS10000TL

Certification Report Network Code Requirements for a PGU of Type A - Poland

Afore New Energy Technology (Shanghai) Co., Ltd.

Report No.: CR-GCC-DNVGL-SE-0124-08501-A072-0
Date: 2022-03-30

DNV

Project name:	HNS[3000-10000]TL HNS3000TL, HNS3600TL-1, HNS3600TL, HNS4000TL, HNS5000TL, HNS6000TL, HNS7000TL, HNS8000TL, HNS9000TL, HNS10000TL	DNV Energy Systems Renewables Certification Germanischer Lloyd Industrial Services GmbH Brooktorkai 18 20457 Hamburg Germany Tel.: +49 40 36149-0
Report title:	Certification Report Network Code Requirements for a PGU of Type A - Poland	
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Report No.:	CR-GCC-DNVGL-SE-0124-08501-A072-0	

Applicable contract(s) governing the provision of this Report: (218130-SFA-20210726)

Objective: Verification of network code compliance of the AFORE solar inverter family HNS[3000-10000]TL including HNS3000TL, HNS3600TL-1, HNS3600TL, HNS4000TL, HNS5000TL, HNS6000TL, HNS7000TL, HNS8000TL, HNS9000TL, HNS10000TL

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Rev. No.	Date	Reason for Issue	Prepared by	Verified and approved by
0	2022-03-30	First issue	Artur Zbroński	Sofien Ben Saad

Table of contents

1 EXECUTIVE SUMMARY

The purpose of this certification report is the documentation of the network code compliance assessment of the generating units: HNS3000TL, HNS3600TL-1, HNS3600TL, HNS4000TL, HNS5000TL, HNS6000TL, HNS7000TL, HNS8000TL, HNS9000TL, HNS10000TL, which is part of the HNS[3000-10000]TL inverter family of AFORE, as listed in section 4.2 of this certification report.

The assessment is made based on the following provided measurement reports and statements:

- Test report: 10304979-SHA-TR-03-A, ISO17025 accredited /1/
- Manufacturer information provided by AFORE /6/

Tests were performed on the HNS9000TL unit. The test report /1/ and the corresponding manufacturer information /6/ were assessed according to the assessment criteria of the guidelines in section 2. A transferability assessment has been made, presented in section 6, to assess how the test result for the HNS9000TL unit can be accepted for the whole HNS[3000-10000]TL inverter family.

The result of the assessment is stated in the end of this certification report, which gives a recommendation as part for the final certification decision.

2 ASSESSMENT CRITERIA

The assessment is based on the following, with the scope as specified in Section 3.

/A/ Service Specification DNVGL-SE-0124: Certification of Grid Code Compliance, DNV GL, March 2016

/B/ Conditions and procedures for using certificates in the process of connecting power generating modules to power networks, Warunki i procedury wykorzystania certyfikatów w procesie przyłączenia modułów wytwarzania energii do sieci elektroenergetycznych, version 1.2, PTPiREE, dated 2021-04-28, (in the following: PTPiREE 2021-04)

/C/ Requirements of general application resulting from Commission Regulation (EU) 2016/631 of 14 April 2016 establishing a network code on requirements for grid connection of generators (NC RfG) – as approved by the decision of the President of the Energy Regulatory Office DRE.WOSE.7128.550.2.2018.ZJ dated January 2nd 2019, Wymogi ogólnego stosowania wynikające z Rozporządzenia Komisji (UE) 2016/631 z dnia 14 kwietnia 2016 r. ustanawiającego kodeks sieci dotyczący wymogów w zakresie przyłączenia jednostek wytwórczych do sieci (NC RfG), PSE S.A., dated 2018-12-18 zatwierdzone Decyzją Prezesa Urzędu Regulacji Energetyki DRE.WOSE.7128.550.2.2018.ZJ z dnia 2 stycznia 2019 r, (in the following: PSE 2018-12)

/D/ Commission Regulation (EU) 2016/631 of 14 April 2016 establishing a network code on requirements for grid connection of generators, published in the Official Journal of the European Union L112/1, THE EUROPEAN COMMISION, 27/04/2016. (in the following: NC RfG)

3 SCOPE OF ASSESSMENT

3.1 General

The assessment covers requirements applicable to Type A Power Park Modules (PPM)s for which Equipment Certificates are requested in the Polish certification guideline PTPIREE 2021-04 /B/, as further detailed in Section 3.2. The assessment covers both exhaustive requirements, fully defined by the NC RfG /D/, and non-exhaustive requirements, for which complementary requirement details have been collected from the national specification for Poland in PSE 2018-12 /C/.

The scope of assessment covers the following:

- The completeness of documents and measurements
- The plausibility of the documents received
- The compliance of the test conditions of the documents with those listed in section 2
- The assessment of the measurement results concerning the requirements of the documents listed in section 2

3.2 Paragraphs of NC RfG /D/ within scope

Table 3-1 Scope of assessment and results

Capability	NC RfG /D/	PSE 2018-12 /C/	Type A	Assessment result (*)
Frequency range	13.1 (a)	13.1 (a)(i)	x	Compliant
Rate of Change of Frequency (RoCoF) withstand capability, df/dt	13.1 (b)	13.1 (b)	x	Compliant
Remote cessation of active power	13.6	13.6	x	Compliant
Limited Frequency Sensitive Mode – Over Frequency (LFSM-O)	13.2	13.2 (a), (b), (f)	x	Compliant

(*) *Please note also the corresponding conditions for compliance, as stated section 7.*

4 GENERAL INFORMATION

4.1 Schematic description of the generating unit

The AFORE solar inverter family HNS[3000-10000]TL, consisting of: HNS3000TL, HNS3600TL-1, HNS3600TL, HNS4000TL, HNS5000TL, HNS6000TL, HNS7000TL, HNS8000TL, HNS9000TL, HNS10000TL convert electrical energy generated by photovoltaic modules (DC) to a single phase alternating current (AC).

They run at 230 V (phase to neutral) rated output voltage with a rated active power output of 3 kW to 10 kW. The different output power variants are achieved through derating via software. Models HNS3600TL-1 have 1 PV input string, HNS3000TL, HNS3600TL, HNS4000TL, HNS5000TL and HNS6000TL have 2 PV input strings, HNS7000TL and HNS8000TL have 3 PV input strings, HNS9000TL and HNS10000TL have 4 PV input strings. There are no further differences in the hardware or firmware used, as stated by the manufacturer /6/.

The electrical data of the generating unit is summarized in the following section.

4.2 Technical data of main components

Main technical data of the main components of the HNS[3000-10000]TL is given below, as provided in Manufacturer Information /6/.

Table 4-1 General Specifications

Generating Unit	**HNS3000TL**	**HNS3600TL-1**	**HNS3600TL**	**HNS4000TL**	**HNS5000TL**
No. of phases	1	1	1	1	1
Rated apparent power	3000VA	3600VA	3600VA	4000VA	5000VA
Rated active power	3000W	3600W	3600W	4000W	5000W
Rated AC-voltage (phase to neutral)	230 Vac	230 Vac	230 Vac	230 Vac	230 Vac
Rated frequency	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz
Generating Unit	**HNS6000TL**	**HNS7000TL**	**HNS8000TL**	**HNS9000TL**	**HNS10000TL**
No. of phases	1	1	1	1	1
Rated apparent power	6000VA	7000VA	8000VA	9000VA	10000VA
Rated active power	6000W	7000W	8000W	9000W	10000W
Rated AC-voltage (phase to neutral)	230 Vac	230 Vac	230 Vac	230 Vac	230 Vac
Rated frequency	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz

Table 4-2 DC Input

	HNS3000TL, HNS3600TL, HNS4000TL, HNS5000TL, HNS6000TL	**HNS3600TL-1**	**HNS7000TL, HNS8000TL**	**HNS9000TL, HNS10000TL**
Min. MPPT voltage	70V	70V	70V	70V
Max. MPPT voltage	550V	550V	550V	550V
Max. DC input voltage	600V	600V	600V	600V
Max. DC input current	14*2A	14A	14+26A	26*2A

Table 4-3 Software version

Firmware version	1.01
Software version	V2.27B 10-14

Unit Transformer

The transformer is not part of the generating unit and consequently has not been part of the assessment.

Grid protection

The grid protection is not part of certification scope.

Control settings

The control interface allows for the selection of different parameter sets via the "*Safety*" field, which provide default settings based on specific grid codes and national requirements. For this certification report the parameter set called "Poland" in the display interface, was assessed for the functionalities within scope of this certification.

It should be noted that compliance can be achieved also with other parameter sets and control settings, but that changes to control settings will affect the inverter control behaviour which can thus affect compliance. It should be noted the final settings must be agreed on project level in agreement with relevant system operator.

Protection settings has not been part of the assessment. Since these could intervene with and affect the compliance of the assessed functionalities, this must be further assessed at project level.

4.3 Performed tests, test setup

The tests used for this assessment, presented in the test report /1/ were performed between 2022-02-17 and 2022-02-22 in the Afore lab, Shanghai in P.R. China. The tests were performed according to a tailor-made test plan /2/ issued by DNV

Renewables Certification, since there is no standard test guideline for Polish requirements. The test plan was based on the Polish Network Code requirements as presented in Section 3.

All tests were performed under ISO-17025 accreditation and they were performed on the HNS9000TL unit.

Table 4-4 Performed tests, as documented in test reports /1/

Test	Test report
Frequency range	3.1. of /1/
Rate of Change of Frequency (RoCoF) withstand capability, df/dt	3.2 of /1/
Remote cessation of active power	3.3 of /1/
Limited Frequency Sensitive Mode – over frequency (LFSM-O)	3.4 of /1/

The tests were performed using a DC Power supply as a simulation of the PV module and a grid simulator as a simulation of the power grid and the transmission network. A simplified diagram of the test setup is given in Figure 4-1. The measurement data were measured at MP3 at LV level.

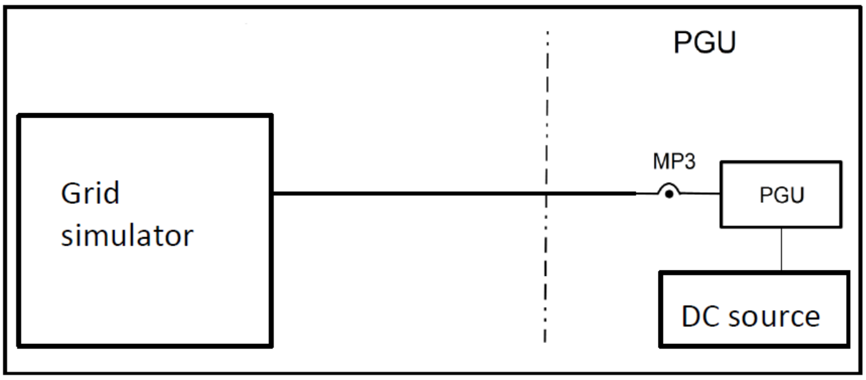

Figure 4-1 Single line diagram of the test setup

5 VERIFICATION OF NETWORK CODE COMPLIANCE

5.1 Frequency Range

5.1.1 Introduction

The frequency range requirements, as specified for Continental Europe in Article 13 item 1 (a) (i) in NC RfG /D/ and the national specification for Poland PSE 2018-12 /C/, are summarized in Table 5-21.

Table 5-1 Frequency range: requirements

Frequency range	Required time for operation
47.5 Hz-48.5 Hz	30 min
48.5 Hz-49.0 Hz	30 min
49.0 Hz-51.0 Hz	Unlimited
51.0 Hz-51.5 Hz	30 min

5.1.2 Test setup and description

The tests were performed using a DC Power supply as a simulation of the PV module and a grid simulator as a simulation of the power grid and the transmission network.

The tests presented in the chapter 3.1. of assessed test report /1/ were performed according to a tailor made test plan /2/ basing on EN 50549-10:2021 (Draft), section 5.2.1.

The aim of this test was to confirm that the tested equipment is capable of remaining connected to the network and operate within the specified frequency ranges. The operating frequency setpoint was set to defined values, and operation was observed for at least the time specified in Table 5-2.

5.1.3 Assessment summary

Table 5-2 presents the time duration tested as specified in the test report /1/. The inverter tested did not disconnect of show signs of instability during this time.

Table 5-2 Frequency range tests

	Frequency value	Time period for operation	Power factor	Tests performed /1/
f_1	47.5 Hz	30 min	1	>38 min at 47.5 Hz
f_2	51.5 Hz	30 min	1	>32 min at 51.5 Hz

The test for 48.5-49 Hz range was not performed, since worse case was tested (47.5 Hz) and the required time for operation is the same. The test for 49-51 Hz was not performed since this is a normal operating range and all other tests were performed at this frequency range.

Based on the performed tests, it can be confirmed that the frequency range capability of the inverter is in compliance with stated requirements.

5.2 Rate of Change of Frequency (RoCoF) withstand capability

5.2.1 Introduction

Regarding RoCoF withstand capability, as specified in Article 13 item 1 (b) of NC RfG /D/, together with the national specification for Poland in PSE 2018-12 /C/, the Power Generating Unit (PGU) must have the capability of remaining connected to the network and operate at the rate of change of frequency up to:

$$\left|\frac{df_{max}}{dt}\right| = 2.0 \left|\frac{Hz}{s}\right|$$

where this value would be measured as an average value within a shiftable measurement window with a length of 500 ms.

The requirement $\left|\frac{df_{max}}{dt}\right| = 2.0 \left|\frac{Hz}{s}\right|$ constitutes a minimum requirement. If the applied technology allows connection to the network and operation at a higher rate of change of frequency, limiting the operation of the PGU to the value defined above or lower is not allowed, unless it results from the arranged rate-of-change-of-frequency-type loss of mains protection.

5.2.2 Test setup and description

The tests were performed using a DC Power supply as a simulation of the PV module and a grid simulator as a simulation of the power grid and the transmission network.

The tests presented in chapter 3.2 of test report /1/ for RoCoF withstand capability were performed tailor made test plan /2/ basing on EN 50549-10:2021 (Draft), section 5.3.1.

The tests were carried out as a series of three frequency steps as presented on the upper plot of Figure 5-1, each performed with at least 2Hz/s rate of change of frequency.

5.2.3 Assessment summary

Tests of the RoCoF withstand capability, reported in test report /1/, confirm the capability to ride through frequency drift between 49-51 Hz, with a gradient of at least ±2 Hz/s. Figure 5-1 show the inverter riding through frequency gradients up to + 3.317/- 3.227 Hz/s, while remaining in stable operation. It can be confirmed that RoCoF withstand capability of the inverter is in compliance with stated requirements.

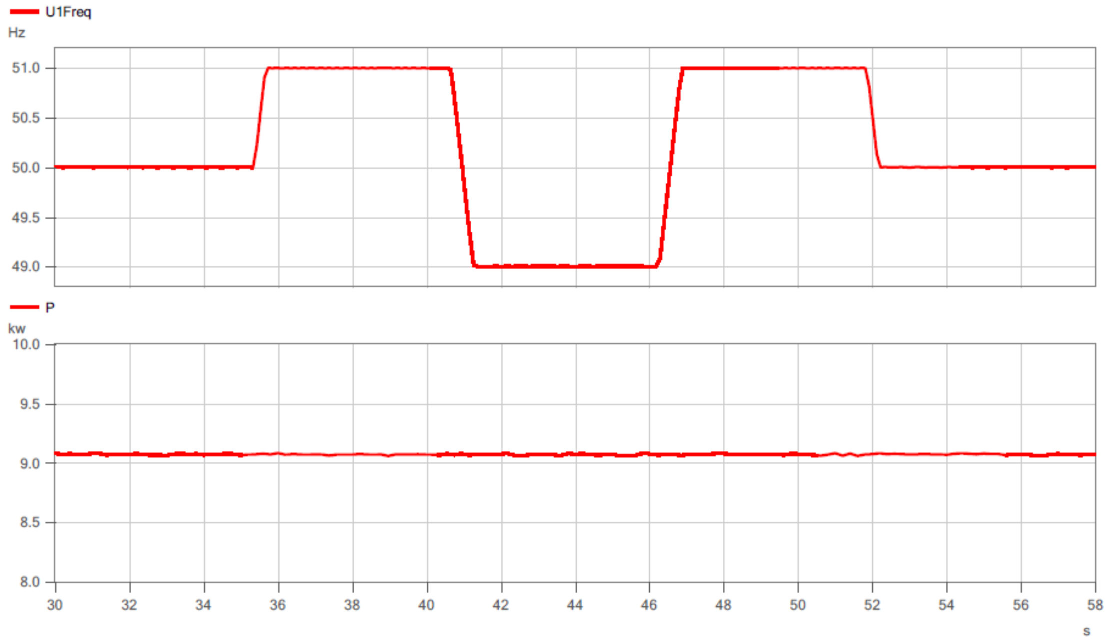

Figure 5-1 RoCoF withstand test results, showing grid frequency (upper plot) and output power (lower plot), /1/

5.3 Cessation of Active Power

5.3.1 Introduction

General requirements relating to Cessation of Active Power for Types A PGUs are defined by Article 13 item 6 of NC RfG /D/. Further specification for Poland is added by Article 13 item 6 of PSE 2018-12 /C/. The unit shall be equipped with a logic interface (input port) in order to cease active power output within five seconds following an instruction being received at the input port.

It is required that PGU is adapted to remote control of the facility by a relevant SO. Telecommunication standards shall be determined by a relevant SO. The relevant SO shall also have the right to specify requirements for equipment to make this facility operable remotely.

As no specific communication standards have been stated in the assessment criteria used for this certification, in section 13 (6) of the PSE 2018-12 /C/, the compliance to any telecommunication standards must be further assessed at project level.

5.3.2 Test setup and description

The tests were performed using a DC Power supply as a simulation of the PV module and a grid simulator as a simulation of the power grid and the transmission network.

The tests presented in chapter 3.3 of test report /1/ for cessation of active power were performed according to tailor made test plan /2/. Inverter was operated remotely to validate its capability to cease active power within 5 seconds. To achieve remote control, a RS485 input of the inverter was used, and a pulse signal of RS485 pin was measured when the cessation command was executed by sending a command in the Serial debugging tool. The time period was measured following the cessation command being sent till the active power was reduced to zero.

5.3.3 Assessment summary

The test result, further presented in test report /1/, show that the inverter is capable of reducing the active power within 0.58 s after reception of remote shutdown signal to cease active power.

Function and delay time must finally be ensured at project level, considering both local communication standards and the full communication line between central control and inverter. Please see corresponding condition in section 7. As far as can be assessed at unit level based on the specifications made in PSE 2018-12, the performed tests prove that the inverter can comply with the requirements.

5.4 Limited Frequency Sensitive Mode - Overfrequency (LFSM-O)

5.4.1 Introduction

The requirements for LFSM-O capabilities for Types A power-generating modules are defined by Article 13 item 2 of NC RfG /D/. Further national specification is added by corresponding article in PSE 2018-12 /C/.

The PGU shall be capable of providing active power frequency response according to the Figure 5-2 with selectable frequency threshold in the range: 50.2 Hz-50.5 Hz, with default value of, 50.2 Hz and a selectable droop settings in the range: 2-12%, with default value of 5%. A response time for activation longer than 2 second must be motivated technically, and the unit must be able to operate stably in LFSM-O mode when active power decreases down to its minimum regulating level. As further specified for Poland, the maximum capacity power (rather than the actual power before LFSM-O activation) shall be used as reference value P_{REF} to calculate the droop. Furthermore, it must be possible for the System Operator (SO) to intervene and block the LFSM-O mode.

There is a specific request in Article 13 item 2(g) of NC RfG /D/ that when LFSM-O is active, the “LFSM-O setpoint will prevail over any other active power setpoints”. This is not further addressed in PSE 2018-12 /C/, but the authors PTPiREE has stated that implementations where the active power setpoint can be further decreased, but never increased, is to be accepted **/8/**.

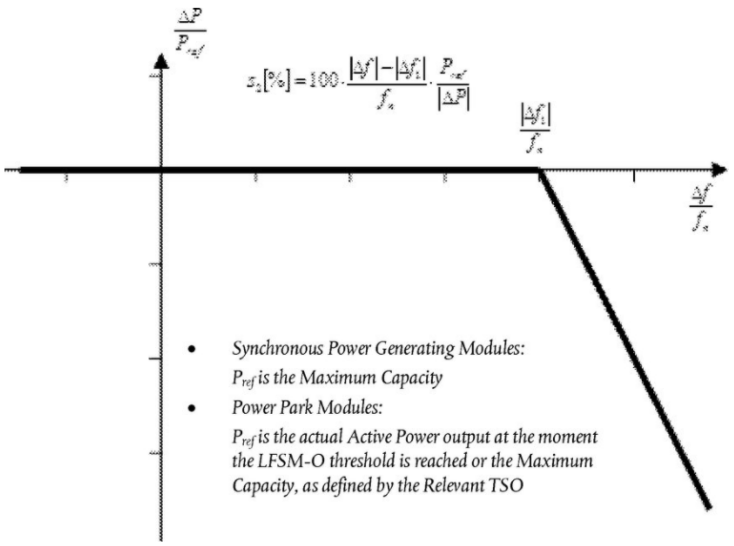

Figure 5-2 Active power frequency response capability of power-generating modules in LFSM-O. NC RfG /D/

5.4.2 Test setup and description

The tests were performed using a DC Power supply as a simulation of the PV module and a grid simulator as a simulation of the power grid and the transmission network.

The tests presented in the chapter 3.4 of assessed test report /1/ were performed as follows: for LFSM-O were performed according to tailor made test plan /2/ basing on FGW TG3 Rev. 25 /7/. For these tests the operating frequency was increased by the grid simulator causing the PGU to realise an increment in frequency, which then caused a decrement in output power due to LFSM-O functionality.

The tests were carried out for 3 different parameter sets to confirm ability for parameter changes and proper behaviour with those settings.

Table 5-3 Settings for LFSM-O tests

	Setting 1	Setting 2	Setting 3
Activation threshold	50.2 Hz	50.2 Hz	50.5 Hz
Droop	5 %	12 %	2%

The frequency steps performed were as follows:

Table 5-4 Frequency steps for LFSM-O tests

Frequency step	Simulated grid frequency setting 1 and setting 2	Simulated grid frequency setting 3
1	50 Hz ± 0.05 Hz	50 Hz ± 0.05 Hz
2	50.1 Hz ± 0.05 Hz	50.4 Hz ± 0.05 Hz
3	50.3 Hz ± 0.05 Hz	50.6 Hz ± 0.05 Hz
4	50.9 Hz ± 0.05 Hz	50.9 Hz ± 0.05 Hz
5	51.4 Hz ± 0.05 Hz	51.4 Hz ± 0.05 Hz
6	50.3 Hz ± 0.05 Hz	50.6 Hz ± 0.05 Hz
7	50 Hz ± 0.05 Hz	50 Hz ± 0.05 Hz

5.4.3 Assessment summary

A selection of the LFSM-O test results, as provided in test report /1/, are presented in Figure 5-3 and Figure 5-5. They show how the output power (upper plot) responds to frequency steps (lower plot) in the range of 50.0 and 51.4 Hz. As can be seen in test result (in Figure 5-3 and Figure 5-5), the inverter shows stable operation during LFSM-O, also at minimum regulating level, and it complies with the maximum delay time of activating frequency response below 2s.

As presented on Figure 5-4, the results match the defined droop characteristics within defined tolerance bands (±5% P_n as defined in FGW TG3 /7/). It was also confirmed that the inverter uses maximum active power, which is also equal to rated apparent power for each variant, as specified in Table 4-1, as a reference value to calculate appropriate LFSM-O response.

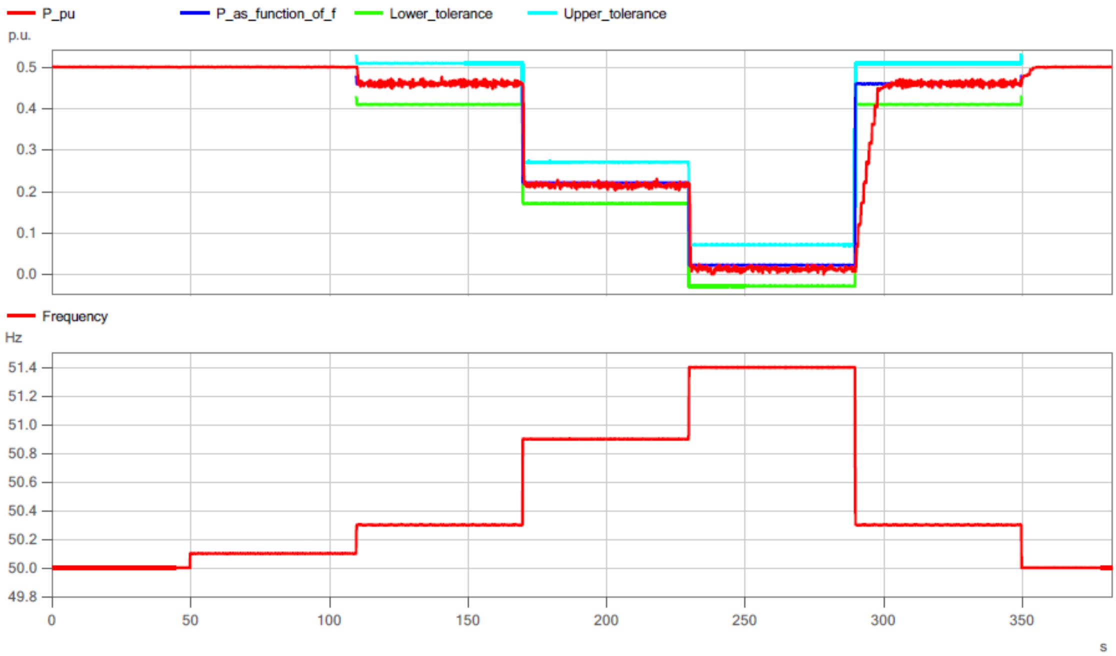

Figure 5-3 LFSM-O test results, showing input frequency steps (lower plot) and the response in active power output (upper plot), droop:5%, activation threshold: 50,2 Hz /1/

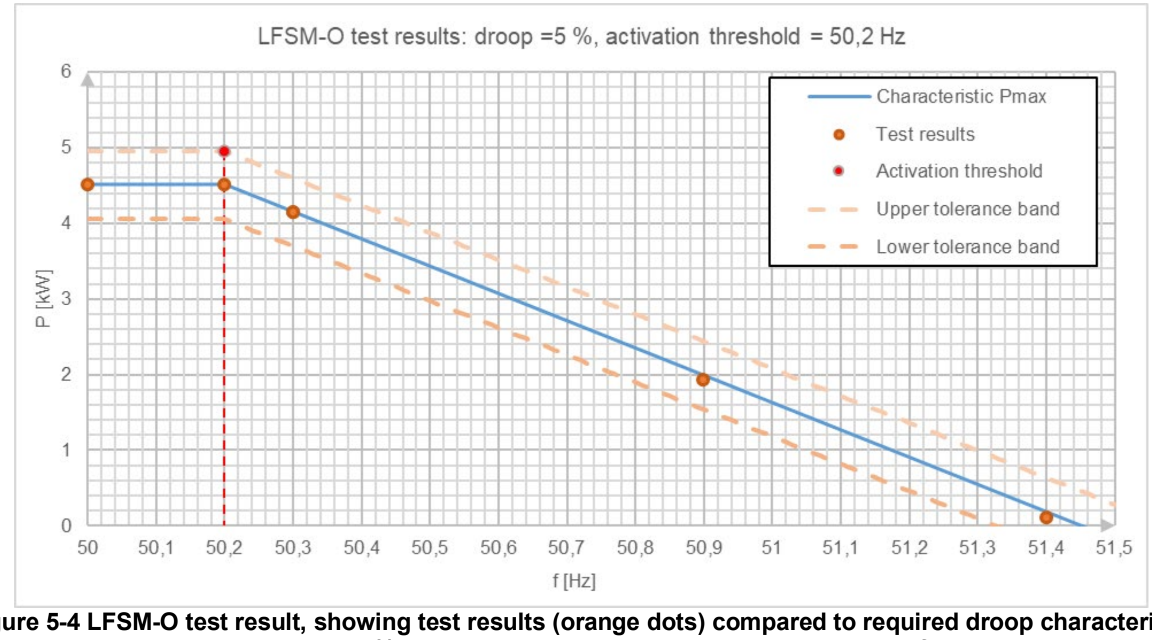

Figure 5-4 LFSM-O test result, showing test results (orange dots) compared to required droop characteristic (blue line). droop:5%, activation threshold: 50,2 Hz, Based on data from /1/

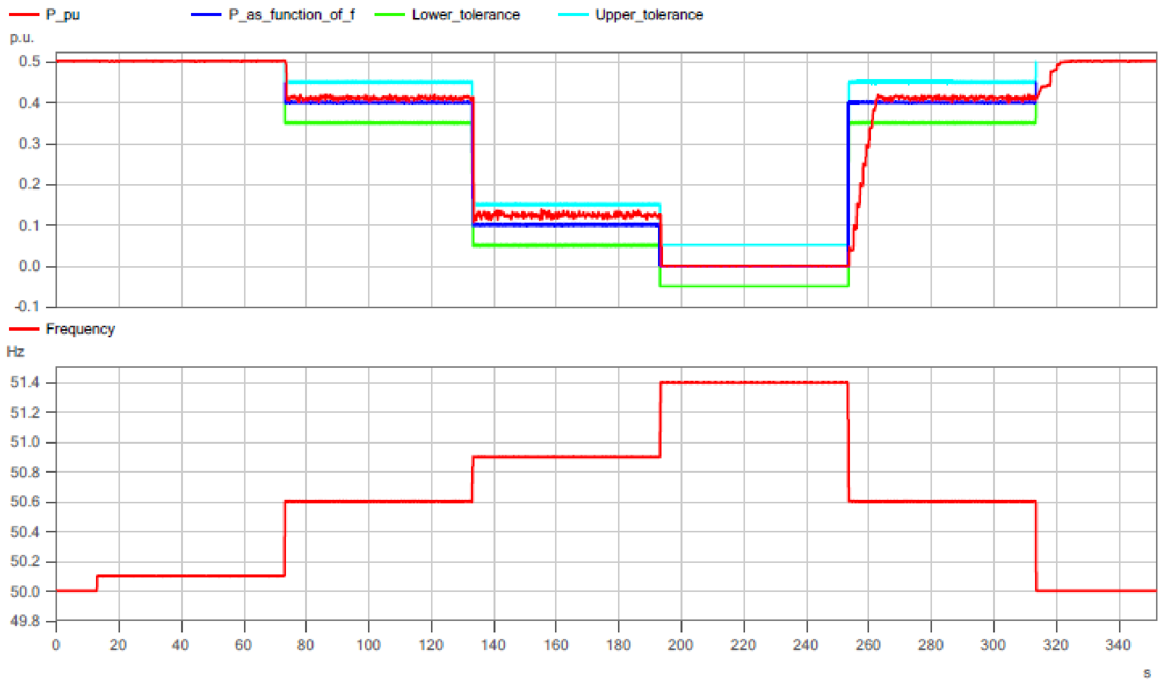

Figure 5-5 LFSM-O test results, showing input frequency steps (lower plot) and the response in active power output (upper plot) droop:2%, activation threshold: 50,5 Hz, deactivation threshold off /1/

Three sets of parameters were used during the testing campaign, which confirmed possibility to set the parameters within required ranges. It should be noted that the droop is controlled via “IfDereaseRatio” parameter. Additionally, parameter “IfStartFreq” acts as a setting for activation threshold. The parameter can be set through serial communication detailed in test report /1/.

Regarding the possibilities for remote blocking and intervention operation, as requested in Article 13 item 1(a) of PSE 2018-12, AFORE declares via manufacturer information /6/ that it is possible to disable the function remotely via the RS485 port interface, which has been deemed sufficient. The local setup for remote access and communication protocols must be agreed at project level.

Based on the performed tests and provided information, compliance with stated requirements can be confirmed.

6 TRANSFERABILITY

In order to use test result from the HNS9000TL for certification of all variants in the HNS[3000-10000]TL family, as listed in section 4.2, a transferability assessment has been made. The DNV service specification DNVGL-SE-0124 /A/ and standard DNVGL-ST-0125 /4/ allow for transfer of measurements based on technical equivalence, meaning that there should be no differences between the variants that could influence the measured and assessed electrical behaviour in a negative way. Regarding the allowable range for transfer of test result, the closest applicable instruction is found in German certification guideline FGW TG8 rev 9 /3/ and grid code VDE-AR N 4110 /5/, which states that result from the tested unit may be transferred to apparent power range:

$$S_{MIN} = \frac{1}{\sqrt{10}} S_{TEST} \leq S_{TEST} \leq 2 \cdot S_{TEST} = S_{MAX}$$

For PV inverters, there is a specific allowance to extend this range, if justified in agreement with the certifier. This is stated in 2.12.2 of the corresponding certification guideline FGW TG8 rev 9 /3/. Within the transferable range, it is required that the variant expected to show the least favourable test result should be tested, which should be motivated by AFORE.

For the assessed family, which includes units in a range from 3 kW to 10 kW (and correspondingly 3 to 10 kVA), it has been accepted to test only one variant. AFORE has submitted documentation /6/ with descriptions of the relevant similarities and differences between the variants, as further described in 4.1, and how these could influence the certified capabilities. From this, it can be confirmed that the generating units can be considered technically equivalent and that any differences between them would have no influence on the capabilities assessed.

The second largest variant within the family, the HNS9000TL with a rated active power of 9 kW (correspondingly 9 kVA) was tested to allow the test results to be transferred to all variants within the series. The test result, which are presented in percentages of nominal power in the test report, would not differ between the variants within the family.

7 CONDITIONS

- Changes of the system design, hardware or the software of the certified PV inverters are to be approved by DNV
- Inverter settings must finally be agreed and checked at project level to ensure grid code compliance, based on the requirements of relevant System Operator (SO). For the functionalities within scope of this certification, more information about the settings assessed is found in *Control Settings* in section 4.2 as well as the corresponding assessment sections 5.1-5.4.
- The capability of remote control has been shown on unit level but must finally be ensured at project level, considering any further requirements of relevant System Operator (SO) and the full communication network. For the functionalities within scope of this certification, this concerns remote cessation of active power (see section 5.3) and Remote blocking and control of LFSM-O (see section 5.4)

8 CONCLUSION

The AFORE solar inverter family HNS[3000-10000]TL, including HNS3000TL, HNS3600TL-1, HNS3600TL, HNS4000TL, HNS5000TL, HNS6000TL, HNS7000TL, HNS8000TL, HNS9000TL, HNS10000TL, as described in section 4.2 has been assessed for compliance regarding the evaluation criteria as detailed in section 2 with the scope detailed in section 3. Under consideration of the conditions given in section 7 there is no objection against assuming the inverter family HNS[3000-10000]TL complies with those assessment criteria listed in section 2.

9 REFERENCES

/1/	Measurement of power control characteristics of a PV inverter of the type HNS9000TL according to FGW TG3 Rev. 25 and Polish Grid Code, Report No: 10304979-SHA-TR-03-A	38 pages	Dated 2022-03-02
/2/	Test plan: Grid Code Compliance testing in Poland Family HNS[3000-10000]TL - Issued by DNV	20 pages	Dated 2021-07-27
/3/	Technical guideline: FGW TG8: Technical Guideline Part 8 – Certification of the electrical characteristics of power generating units, systems and storage as well as for their components connected to the grid, FGW, Revision 9/	325 pages	Dated 2019-02-01
/4/	Standard: DNVGL-SE-0125: Grid code compliance, DNV GL, March 2016	61 pages	Dated 2016-03
/5/	Standard: VDE-AR-N 4110: Technical requirements for the connection and operation of customer installations to the medium voltage network, VDE, 2018-11	260 pages	Dated 2018-11
/6/	Manufacturer's information, Declaration number. AF2021-09002	5 pages	Dated 2022-02-07
/7/	Technical Guidelines for Power Generating Units and Systems, Part 3: Determination of electrical characteristics of power generating units and systems connected to MV, HW and EHV grids, published by Fördergesellschaft Windenergie und andere Erneuerbare Energien e.V. (FGW) Revision 25	327 pages	Dated 01/09/2018
/8/	Email from PTPiREE: "Kilka pytań" (Clarification for negative sequence)	5 pages	Received 2020-12-02

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