CERTIFICATE OF CONFORMITY

Issued to:	EcoFlow Inc. RM 401, Plant #1, Runheng Industrial Zone, Fuyuanyi Road, Zhancheng Community, Fuhai Street, Bao'an District, Shenzhen City, Guangdong Province, P.R. China
For the product:	EcoFlow PowerOcean Hybrid Inverter
Trade name:	ECOFLOW or ECOFLOW
Type/Model:	EF HD-P1-3K-S1, EF HD-P1-3.68K-S1
Ratings:	See Annex
Manufactured by:	EcoFlow Inc. RM 401, Plant #1, Runheng Industrial Zone, Fuyuanyi Road, Zhancheng Community, Fuhai Street, Bao'an District, Shenzhen City, Guangdong Province, P.R. China
Requirements:	Engineering Recommendation G98 Issue 1 – Amendment 7: 2022 (G98/1-7)

This Test Certificate is granted on account of an examination by DEKRA, the results of which are laid down in a confidential file no. 6167407.50V1.1.

The examination has been carried out on one single specimen of the product. The certificate does not include an assessment of the manufacturer's production. Conformity of his production with the specimen tested by DEKRA is not the responsibility of DEKRA.

This Test Certificate expires at the latest on 22 March 2029 or expires upon withdrawal of one of the above mentioned standards.

Shanghai, 22 March 2024 Certificate Number: 6167407.01COCV1.1

DEKRA Testing and Certification (Shanghai) Ltd.

Cliff Lin
Certification Manager

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Accreditation of the certification body by IAS according to ISO/IEC 17065 for products. PCA-141
Accreditation is valid in the areas of certification mentioned in the certificate.

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Annex

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Ratings of the test product:

Specifications table		
Model	EF HD-P1-3K-S1	EF HD-P1-3.68K-S1
Input		
Vmax PV (Vdc)	600	600
MPPT Voltage Range (Vdc)	90-520	90-520
Isc PV (absolute Max.) (A)	20 / 20	20 / 20
Number of MPP trackers	2	2
Max. PV input current (A)	18 / 18	18 / 18
Battery Port (charge/discharge)		
Battery type	Li-ion	
Battery Nominal Voltage (V)	790	
Max Battery Voltage (V)	800	
Rated Current (A)	7.6	7.6
Max. Current (A)	7.6	7.6
AC Grid (output and input)		
Normal AC Voltage (Vac)	L/N/PE, 230Vac	
Frequency (Hz)	50	
Rated output Current (A)	13.1	16.0
Nominal output Power (VA)	3000	3680
Max. apparent output Power (VA)	3000	3680
Power factor(adjustable)	-0.8...1...+0.8	
AC Load output		
Normal Voltage (Vac)	L/N/PE, 230Vac	
Frequency (Hz)	50	
Rated output Current (A)	13.1	16.0
Nominal output Power (W)	3000	3680
Max. apparent output Power (VA)	3000	3680
Others		
Ingress protection (IP)	IP65	
Protective class	Class I	
Temperature (°C)	-20°C to +50°C	
Inverter Isolation	Non-isolated	
Overvoltage category	OVC III (AC Main), OVC II (DC)	

Annex

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G98/1-7 Form C: Type Test Verification Report	
Extract form test report number:	**6167407.50V1.1**

Model: EF HD-P1-3.68K-S1				**P**
Test 1:				
Measured Voltage (V)	Measured Frequency (Hz)	Measured Power (W)	Measured Power factor	Test Time (seconds)
195.66	46.999	3643.32	0.995	29
Test 2:				
Measured Voltage (V)	Measured Frequency (Hz)	Measured Power (W)	Measured Power factor	Test Time (Minutes)
195.46	47.499	3680.10	0.996	90
Test 3:				
Measured Voltage (V)	Measured Frequency (Hz)	Measured Power (W)	Measured Power factor	Test Time (Minutes)
253.07	51.499	3645.55	0.995	90
Test 4:				
Measured Voltage (V)	Measured Frequency (Hz)	Measured Power (W)	Measured Power factor	Test Time (Minutes)
253.15	51.999	3624.72	0.995	15
Test 5:				
Measured Voltage (V)	Measured Frequency (Hz)	Measured Power (W)	Measured Power factor	Test Time (Minutes)
230.2	49.999	3671.68	0.996	90
Test 6:				
Measured Voltage (V)	Ramp range	Test frequency ramp	Test Duration	Confirm no trip
195.5	47.0 Hz to 52.0 Hz	+1 Hzs^{-1}	5.0s	No trip
253.0	52.0 Hz to 49.0 Hz	-1 Hzs^{-1}	3.0s	No trip

2. Power Quality – Harmonics:						**P**
These tests should be carried out as specified in BS EN 61000-3-2. The chosen test should be undertaken with a fixed source of energy at two power levels a) between 45 and 55% and b) at 100% of **Registered Capacity**. The test requirements are specified in Annex A1 A.1.3.1 (**Inverter** connected) or Annex A2 A.2.3.1 (Synchronous).						
Model: EF HD-P1-3.68K-S1						
Micro-generator tested to BS EN 61000-3-2						
Micro-generator rating per phase (rpp)			3.68		kW	
For 3-phase **Micro-generator**s, tick this box if harmonic measurements are identical for all three phases. If the harmonics are not identical for each phase, please replicate this section with the results for each phase.			Single phase inverter			
Harmonic	At 45-55% of **Registered Capacity**		100% of **Registered Capacity**			
	Measured Value MV in Amps	--	Measured Value MV in Amps	--	Limit in BS EN 61000-3-2 in Amps	Higher limit for odd harmonics 21 and above
2	0.033	--	0.019	--	1.080	
3	0.176	--	0.169	--	2.300	
4	0.007	--	0.011	--	0.430	
5	0.095	--	0.122	--	1.140	
6	0.015	--	0.009	--	0.300	
7	0.011	--	0.047	--	0.770	
8	0.016	--	0.013	--	0.230	
9	0.083	--	0.119	--	0.400	
10	0.011	--	0.014	--	0.184	
11	0.041	--	0.088	--	0.330	
12	0.008	--	0.010	--	0.153	
13	0.061	--	0.111	--	0.210	
14	0.006	--	0.012	--	0.131	
15	0.047	--	0.096	--	0.150	
16	0.003	--	0.012	--	0.115	
17	0.063	--	0.114	--	0.132	
18	0.008	--	0.008	--	0.102	
19	0.061	--	0.090	--	0.118	
20	0.006	--	0.009	--	0.092	
21	0.027	--	0.082	--	0.107	0.160
22	0.003	--	0.011	--	0.084	
23	0.044	--	0.055	--	0.098	0.147

24	0.003	--	0.009	--	0.077	
25	0.017	--	0.047	--	0.090	0.135
26	0.003	--	0.007	--	0.071	
27	0.029	--	0.031	--	0.083	0.124
28	0.009	--	0.005	--	0.066	
29	0.017	--	0.041	--	0.078	0.117
30	0.008	--	0.007	--	0.061	
31	0.013	--	0.012	--	0.073	0.109
32	0.005	--	0.007	--	0.058	
33	0.026	--	0.038	--	0.068	0.102
34	0.005	--	0.008	--	0.054	
35	0.007	--	0.014	--	0.064	0.096
36	0.003	--	0.005	--	0.051	
37	0.026	--	0.027	--	0.061	0.091
38	0.003	--	0.003	--	0.048	
39	0.015	--	0.017	--	0.058	0.087
40	0.002	--	0.006	--	0.046	

Note the higher limits for odd harmonics 21 and above are only allowable under certain conditions, if these higher limits are utilised please state the exemption used as detailed in part 6.2.3.4 of BS EN 61000-3-2 in the box below.

2. Power Quality – Harmonics:						**P**
These tests should be carried out as specified in BS EN 61000-3-2. The chosen test should be undertaken with a fixed source of energy at two power levels a) between 45 and 55% and b) at 100% of **Registered Capacity**. The test requirements are specified in Annex A1 A.1.3.1 (**Inverter** connected) or Annex A2 A.2.3.1 (Synchronous).						
Model: EF HD-P1-3K-S1						
Micro-generator tested to BS EN 61000-3-2						
Micro-generator rating per phase (rpp)				3.0	kW	
For 3-phase **Micro-generator**s, tick this box if harmonic measurements are identical for all three phases. If the harmonics are not identical for each phase, please replicate this section with the results for each phase.				Single phase PV inverter		
Harmonic	At 45-55% of **Registered Capacity**		100% of **Registered Capacity**			
	Measured Value MV in Amps	Normalised Value (NV) in Amps	Measured Value MV in Amps	Normalised Value (NV) in Amps	Limit in BS EN 61000-3-2 in Amps	Higher limit for odd harmonics 21 and above

2	0.242	--	0.504	--	1.080	
3	0.285	--	0.419	--	2.300	
4	0.065	--	0.159	--	0.430	
5	0.123	--	0.236	--	1.140	
6	0.057	--	0.072	--	0.300	
7	0.037	--	0.142	--	0.770	
8	0.007	--	0.060	--	0.230	
9	0.064	--	0.123	--	0.400	
10	0.032	--	0.051	--	0.184	
11	0.048	--	0.113	--	0.330	
12	0.011	--	0.030	--	0.153	
13	0.076	--	0.158	--	0.210	
14	0.010	--	0.029	--	0.131	
15	0.085	--	0.115	--	0.150	
16	0.023	--	0.024	--	0.115	
17	0.060	--	0.125	--	0.132	
18	0.015	--	0.014	--	0.102	
19	0.043	--	0.065	--	0.118	
20	0.006	--	0.013	--	0.092	
21	0.038	--	0.065	--	0.107	0.160
22	0.013	--	0.020	--	0.084	
23	0.037	--	0.023	--	0.098	0.147
24	0.014	--	0.018	--	0.077	
25	0.025	--	0.037	--	0.090	0.135
26	0.013	--	0.011	--	0.071	
27	0.030	--	0.026	--	0.083	0.124
28	0.004	--	0.004	--	0.066	
29	0.018	--	0.014	--	0.078	0.117
30	0.005	--	0.016	--	0.061	
31	0.018	--	0.022	--	0.073	0.109
32	0.008	--	0.009	--	0.058	
33	0.021	--	0.008	--	0.068	0.102
34	0.003	--	0.020	--	0.054	
35	0.016	--	0.016	--	0.064	0.096
36	0.003	--	0.018	--	0.051	
37	0.019	--	0.016	--	0.061	0.091
38	0.002	--	0.021	--	0.048	
39	0.013	--	0.018	--	0.058	0.087

40	0.004	--	0.008	--	0.046	

Note the higher limits for odd harmonics 21 and above are only allowable under certain conditions, if these higher limits are utilised please state the exemption used as detailed in part 6.2.3.4 of BS EN 61000-3-2 in the box below.

3. Power Quality – Voltage fluctuations and Flicker:	**P**

These tests should be undertaken in accordance with EREC G98 Annex A1 A.1.3.3 (**Inverter** connected) or Annex A2 A.2.3.3 (Synchronous).

The standard test impedance is 0.4 Ω for a single phase **Micro-generating Plant** (and for a two phase unit in a three phase system) and 0.24 Ω for a three phase **Micro-generating Plant** (and for a two phase unit in a split phase system). Please ensure that both test and standard impedance are completed on this form. If the test impedance (or the measured impedance) is different to the standard impedance, it must be normalised to the standard impedance as follows (where the **Power Factor** of the generation output is 0.98 or above):

d max normalised value = (Standard impedance / Measured impedance) x Measured value.

Where the **Power Factor** of the output is under 0.98 then the X to R ratio of the test impedance should be close to that of the standard impedance.

The stopping test should be a trip from full load operation.

The duration of these tests needs to comply with the particular requirements set out in the testing notes for the technology under test.

The test date and location must be declared.

Test start date	2023-12-11	Test end date	2023-12-11
Test location	No.99, Hongye Road, Suzhou Industrial Park, Suzhou, Jiangsu, P.R. China		
Model	EF HD-P1-3.68K-S1		

	Starting			Stopping			Running	
	d(max)	d(c)	d(t)	d(max)	d(c)	d(t)	P_{st}	P_{lt} 2 hours
Measured Values at test impedance	0.504	0.011	0	0.498	0.016	0	0.035	0.035
Normalised to standard impedance	0.504	0.011	0	0.498	0.016	0	0.035	0.035
Normalised to required maximum impedance	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Limits set under BS EN 61000-3-11	4%	3.3%	3.3%	4%	3.3%	3.3%	1.0	0.65

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Test Impedance	R	0.4	Ω	Xl	0.25	Ω
Standard Impedance	R	0.24 * 0.4 ^	Ω	Xl	0.15 * 0.25 ^	Ω
Maximum Impedance	R	N/A #	Ω	Xl	N/A #	Ω

* Applies to three phase and split single phase **Micro-generators**. Delete as appropriate.

^ Applies to single phase **Micro-generators** and **Micro-generators** using two phases on a three phase system. Delete as appropriate.

4. Power quality – DC injection:	**P**

This test should be carried out in accordance with A 1.3.4 as applicable.

The % **DC** injection ("as % of rated AC current" below) is calculated as follows:

% **DC** injection = Recorded **DC** value in Amps / base current

where the base current is the **Registered Capacity** (W) / 230 V. The % **DC** injection should not be greater than 0.25%.

Model: EF HD-P1-3.68K-S1

Test power level	10%	50%	75%	100%
Recorded DC injection value in Amps	0.039 A	0.025 A	0.021 A	0.026 A
as % of rated AC current	0.24%	0.15%	0.13%	0.16%
Limit	0.25%	0.25%	0.25%	0.25%

4. Power quality – DC injection:	**P**

This test should be carried out in accordance with A 1.3.4 as applicable.

The % **DC** injection ("as % of rated AC current" below) is calculated as follows:

% **DC** injection = Recorded **DC** value in Amps / base current

where the base current is the **Registered Capacity** (W) / 230 V. The % **DC** injection should not be greater than 0.25%.

Model: EF HD-P1-3K-S1

Test power level	10%	50%	75%	100%
Recorded DC injection value in Amps	0.02 A	0.024 A	0.0254 A	0.0211 A
as % of rated AC current	0.15%	0.18%	0.19%	0.16%
Limit	0.25%	0.25%	0.25%	0.25%

5. Power Factor:			**P**
This test shall be carried out in accordance with A.1.3.2 and A.2.3.2 at three voltage levels and at **Registered Capacity** and the measured **Power Factor** must be greater than 0.95 to pass. Voltage to be maintained within ±1.5% of the stated level during the test.			
Model: EF HD-P1-3.68K-S1			
Voltage	0.94 pu (216.2 V)	1.0 pu (230 V)	1.1 pu (253 V)
Measured value	0.993	0.993	0.993
Power Factor Limit	>0.95	>0.95	>0.95
Model: EF HD-P1-3K-S1			
Voltage	0.94 pu (216.2 V)	1.0 pu (230 V)	1.1 pu (253 V)
Measured value	0.993	0.993	0.993
Power Factor Limit	>0.95	>0.95	>0.95

6. Protection – Frequency tests:						**P**
These tests should be carried out in accordance with Annex A1 A.1.2.3 (**Inverter** connected) or Annex A2 A.2.2.3 (Synchronous). For trip tests, frequency and time delay should be stated. For “no trip tests”, “no trip” can be stated.						
Model: EF HD-P1-3.68K-S1						
Function	Setting		Trip test		“No trip tests”	
	Frequency	Time delay	Frequency	Time delay	Frequency / time	Confirm no trip
U/F stage 1	47.5 Hz	20 s	47.49 Hz	20.08 s	47.7 Hz 30 s	No trip
U/F stage 2	47.0 Hz	0.5 s	46.99 Hz	0.533 s	47.2 Hz 19.5 s	No trip
					46.8 Hz 0.45 s	No trip
O/F	52.0 Hz	0.5 s	52.01	0.556 s	51.8 Hz 120.0 s	No trip
					52.2 Hz 0.45 s	No trip
Note: For frequency trip tests the frequency required to trip is the setting ± 0.1 Hz. In order to measure the time delay a larger deviation than the minimum required to operate the projection can be used. The “No trip tests” need to be carried out at the setting ± 0.2 Hz and for the relevant times as shown in the table above to ensure that the protection will not trip in error.						

7. Protection – Voltage tests:						**P**
These tests should be carried out in accordance with Annex A1 A.1.2.2 (**Inverter** connected) or Annex A2 A.2.2.2 (Synchronous). For trip tests, voltage and time delay should be stated. For “no trip tests”, “no trip” can be stated.						
Model: EF HD-P1-3.68K-S1						
Function	Setting		Trip test		“No trip tests”	
	Voltage	Time delay	Voltage	Time delay	Voltage / time	Confirm no trip
U/V	0.8 pu (184 V)	2.5 s	182.98 V	2.53 s	188 V 5.0 s	No trip
					180 V 2.45 s	No trip
O/V stage 1	1.14 pu (262.2 V)	1.0 s	261.98 V	1.034 s	258.2 V 5.0 s	No trip
O/V stage 2	1.19 pu (273.7 V)	0.5 s	273.94 V	0.529 s	269.7 V 0.95 s	No trip
					277.7 V 0.45 s	No trip
Note: For Voltage tests the Voltage required to trip is the setting ±3.45 V. The time delay can be measured at a larger deviation than the minimum required to operate the protection. The No trip tests need to be carried out at the setting ±4 V and for the relevant times as shown in the table above to ensure that the protection will not trip in error.						

8. Protection – Loss of Mains test:						**P**
For PV **Inverter**s shall be tested in accordance with BS EN 62116. Other **Micro-generator**s should be tested in accordance with A.2.2.4 at 10%, 55% and 100% of rated power. For test condition A, EUT output = 100 % P_n, test condition B, EUT output = 50 % to 66 % P_n, and test condition C, EUT output = 25 % to 33 % P_n.						
Model: EF HD-P1-3.68K-S1						
For **Inverter**s tested to BS EN 62116 the following sub set of tests should be recorded in the following table.						
Test Power and imbalance	33% -5% Q Test 22	66% -5% Q Test 12	100% -5% P Test 5	33% +5% Q Test 31	66% +5% Q Test 21	100% +5% P Test 10
Trip time. **Limit is 0.5s**	0.339	0.459	0.399	0.293	0.419	0.413

8. Protection – Frequency change, Vector Shift Stability test:			**P**
This test should be carried out in accordance with EREC G98 Annex A1 A.1.2.6 (**Inverter** connected) or Annex A2 A.2.2.6 (Synchronous). Confirmation is required that the **Micro-generating Plant** does not trip under positive / negative vector shift.			
Model: EF HD-P1-3.68K-S1			
	Start Frequency	Change	Confirm no trip
Positive Vector Shift	49.0 Hz	+50 degrees	No trip
Negative Vector Shift	50.0 Hz	-50 degrees	No trip

8. Protection – Frequency change, RoCoF Stability test:			**P**
The requirement is specified in section 11.3, test procedure in Annex A.1.2.6 (**Inverter** connected) or Annex A2 A.2.2.6 (Synchronous). Confirmation is required that the **Micro-generating Plant** does not trip for the duration of the ramp up and ramp down test.			
Model: EF HD-P1-3.68K-S1			
Ramp range	Test frequency ramp:	Test Duration	Confirm no trip
49.0 Hz to 51.0 Hz	+0.95 Hzs^{-1}	2.1 s	No trip
51.0 Hz to 49.0 Hz	-0.95 Hzs^{-1}	2.1 s	No trip

9. Limited Frequency Sensitive Mode – Over frequency test:					**P**
This test should be carried out in accordance with A.1.2.9. The test should be carried out using the specific threshold frequency of 50.4 Hz and **Droop** of 10%. The measurement tolerances are contained in A.1.2.9.					
Model: EF HD-P1-3.68K-S1					
Alternatively, simulation results should be noted below:					
Test sequence at **Registered Capacity** >80%	Measured **Active Power** Output (W)	Frequency (Hz)	Calculated droop (%)	Primary Power Source	**Active Power** Gradient
Step a) 50.00 Hz ±0.01 Hz	3627.69	49.999	-	Photovoltaic array simulator	-
Step b) 50.45 Hz ±0.05 Hz	3588.06	50.449	9.100		-
Step c) 50.70 Hz ±0.10 Hz	3392.27	50.699	9.348		-
Step d) 51.15 Hz ±0.05 Hz	3056.51	51.149	9.651		-
Step e) 50.70 Hz ±0.10 Hz	3392.48	50.699	9.356		-
Step f) 50.45 Hz ±0.05 Hz	3589.31	50.449	9.397		-
Step g) 50.00 Hz ±0.01 Hz	3626.98	49.999	-		-

Test sequence at **Registered Capacity** 40-60%	Measured **Active Power** Output (W)	Frequency (Hz)	Calculated droop (%)	Primary Power Source	**Active Power** Gradient
Step a) 50.00 Hz ±0.01 Hz	1820.48	49.999	-	Photovoltaic array simulator	-
Step b) 50.45 Hz ±0.05 Hz	1779.54	50.449	8.809		-
Step c) 50.70 Hz ±0.10 Hz	1582.05	50.699	9.230		-
Step d) 51.15 Hz ±0.05 Hz	1225.85	51.149	9.271		-
Step e) 50.70 Hz ±0.10 Hz	1583.22	50.699	9.275		-
Step f) 50.45 Hz ±0.05 Hz	1781.47	50.449	9.245		-
Step g) 50.00 Hz ±0.01 Hz	1892.47	49.999	-		-

The frequency at each step should be maintained for at least one minute and the Active Power reduction in the form of a gradient determined and assessed for compliance with paragraph 11.2.3. The Droop should be determined from the measurements between 50.4 Hz and 51.15 Hz. The allowed tolerance for the frequency measurement shall be ± 0.05 Hz. The allowed tolerance for Active Power output measurement shall be ±10% of the required change in Active Power.

The resulting overall tolerance range for a nominal 10% Droop is +2.8% and – 1.5%, ie a Droop less than 12.8% and greater than 8.5%.

10. Power output with falling frequency test (For PV Inverter):			**P**
This test should be carried out in accordance with A.1.2.7.			
Model: EF HD-P1-3.68K-S1			
Test sequence	Measured **Active Power** Output (W)	Frequency (Hz)	Primary power source
Test a) 50 Hz ± 0.01 Hz	3636.66	49.999	Photovoltaic array simulator
Test b) Point between 49.5 Hz and 49.6 Hz	3636.84	49.549	Photovoltaic array simulator
Test c) Point between 47.5 Hz and 47.6 Hz	3633.62	47.549	Photovoltaic array simulator

NOTE:

The operating point in Test (b) and (c) shall be maintained for at least 5 minutes

The test is regarded as passed if:

• the Micro-generator does not disconnect from the network at the operating points a) to c) when the network frequency is changed and

• the Micro-generator does not reduce output energy at point b) and

• the power reduction at point c) is less than or equal to the allowed power reduction according to paragraph 9.4.2 (Figure 3).

The following data shall be documented:

• variation of the network frequency with time;

• the measured Active Power with time.

11. Power output with falling frequency test (For Electricity Storage Device)				**P**
This test should be carried out in accordance with clause A.1.2.8				
Model: EF HD-P1-3.68K-S1				
Test 1: 50 Hz to 49.0 Hz, from **100%** $P_{rated\text{-}import}$				
Test sequence (Hz)	Measured **Active Power** Output (W)	Steady frequency (Hz)	Calculated droop (%)	Primary power source
50.0	-3636.34	49.999	-	AC grid / Storage Battery
49.5	-3636.35	49.499	-	AC grid / Storage Battery
49.2	318.17	49.199	-	AC grid / Storage Battery
49.0	1772.92	48.999	-	AC grid / Storage Battery
Test 2: 50 Hz to 48.8 Hz, from **100%** $P_{rated\text{-}import}$				
Test sequence (Hz)	Measured **Active Power** Output (W)	Steady frequency (Hz)	Calculated droop (%)	Primary power source
50.0	-3635.74	49.999	-	AC grid / Storage Battery
49.5	-3635.94	49.499	-	AC grid / Storage Battery
49.2	324.27	49.199	-	AC grid / Storage Battery
49.0	1773.33	48.999	-	AC grid / Storage Battery
48.9	2501.63	48.899	-	AC grid / Storage Battery
48.8	3228.71	48.799	-	AC grid / Storage Battery
Test 3: 50 Hz to 49.0 Hz, from **40%** $P_{rated\text{-}import}$				
Test sequence (Hz)	Measured **Active Power** Output (W)	Steady frequency (Hz)	Calculated droop (%)	Primary power source
50.0	-1474.92	49.999	-	AC grid / Storage Battery
49.5	-1474.77	49.499	-	AC grid / Storage Battery
49.2	762.22	49.199	-	AC grid / Storage Battery
49.0	2220.18	48.999	-	AC grid / Storage Battery

Test 4: 50 Hz to 48.8 Hz, from **40%** $P_{rated\text{-}import}$				
Test sequence (Hz)	Measured **Active Power** Output (W)	Steady frequency (Hz)	Calculated droop (%)	Primary power source
50.0	-1475.02	49.999	-	AC grid / Storage Battery
49.5	-1474.75	49.499	-	AC grid / Storage Battery
49.2	710.21	49.199	-	AC grid / Storage Battery
49.0	2170.23	48.999	-	AC grid / Storage Battery
48.9	2897.96	48.899	-	AC grid / Storage Battery
48.8	3622.86	48.799	-	AC grid / Storage Battery

NOTE:
This paragraph provides a method for demonstrating compliance with the optional performance characteristic as discussed in the foreword. The tests shall be carried out to demonstrate how the Power Park Module Active Power when acting as a load (ie replenishing its energy store) responds to changes in system frequency.
In general four tests are proposed, one set of two at rated import capacity, and one set of two at 40% of rated import capacity.
In both cases the test is to reduce frequency from 50 Hz at rate of 2 Hz/s. In the first case the lower frequency reached will be 49.0 Hz and the second case the lower frequency will be 48.8 Hz.
In all cases the response shall meet the requirements of 11.2.3.3.

12. Re-connection timer					**P**
Model: EF HD-P1-3.68K-S1					
Test should prove that the reconnection sequence starts after a minimum delay of 20 s for restoration of voltage and frequency to within the stage 1 settings of Table 2. Both the time delay setting and the measured delay should be provided in this form; both should be greater than 20 s to pass. Confirmation should be provided that the **Micro-generating Plant** does not reconnect at the voltage and frequency settings below; a statement of “no reconnection” can be made.					
Time delay setting	Measured delay	Checks on no reconnection when voltage or frequency is brought to just outside stage 1 limits of Table 10.1.			
60 s	72 s	At 1.16 pu (266.2 V)	At 0.78 pu (180.0 V)	At 47.4 Hz	At 52.1 Hz
Confirmation that the **Micro-generator** does not re-connect.		No Reconnection	No Reconnection	No Reconnection	No Reconnection
Recover to normal operation range after confirmation of no reconnection		Yes	Yes	Yes	Yes
Confirmation that the **Power Generating Module** shall reconnect		Reconnection after 72.8 s	Reconnection after 72.9 s	Reconnection after 73.5 s	Reconnection after 72.9 s

13. Fault level contribution:					**P**
These tests shall be carried out in accordance with EREC G98 Annex A1 A.1.3.5 (**Inverter** connected) and Annex A2 A.2.3.4 (Synchronous). Please complete each entry, even if the fault contribution is zero.					
Model: EF HD-P1-3.68K-S1					
For machines with electro-magnetic output			For **Inverter** output		
Parameter	Symbol	Value	Time after fault	Volts	Amps
Peak Short Circuit current	i_p	N/A	20ms	80	22
Initial Value of aperiodic current	A	N/A	100ms	50	0
Initial symmetrical short-circuit current*	I_k	N/A	250ms	20	0
Decaying (aperiodic) component of short circuit current*	i_{DC}	N/A	500ms	0	0
Reactance/Resistance Ratio of source*	X/R	N/A	Time to trip	0.0584 s	In seconds
For rotating machines and linear piston machines the test should produce a 0 s – 2 s plot of the short circuit current as seen at the **Micro-generator** terminals. * Values for these parameters should be provided where the short circuit duration is sufficiently long to enable interpolation of the plot.					

14. Logic interface (input port)	
Confirm that an input port is provided and can be used to reduce the **Active Power** output to zero	Yes
Provide high level description of logic interface, e.g. details in 9.4.3 such as AC or **DC** signal (the additional comments box below can be used)	Yes
15. Self-Monitoring solid state switching: No specified test requirements. Refer to EREC G98 Annex A1 A.1.3.6 (**Inverter** connected).	
It has been verified that in the event of the solid state switching device failing to disconnect the **Micro-generator**, the voltage on the output side of the switching device is reduced to a value below 50 V within 0.5 s.	N/A
16. Cyber security	
Confirm that the **Manufacturer** or **Installer** of the **Micro-generator** has provided a statement describing how the **Micro-generator** has been designed to comply with cyber security requirements, as detailed in 9.7.	Yes, Manufacturer's declaration provided.
Additional comments.	
To open or short pin14 and pin16 of logic interface port to control the inverter to normal or shutdown active power of output. A logic interface is provided that can be operated by an external switch or contactor. Users can install by themselves. Users install the switch connected to pin14 and pin16 of interface port and just need control the switch signal causing the switch to open or short. When the switch is open, the inverter will operate normally. When the switch is closed, the inverter will cease to export active power immediately. The signal from the inverter that is being switched is DC (maximum value 3.3V).	

-End-