TEST REPORT

COMMISSION REGULATION (EU) No 814/2013

of 2 August 2013 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard

to ecodesign requirements for water heaters and hot water storage tanks COMMISSION DELEGATED REGULATION (EU) No 812/2013

of 18 February 2013 supplementing Directive 2010/30/EU of the European Parliament and of the Council with regard to the energy labelling of water heaters, hot water storage tanks and packages of water heater and solar device

Report Reference No. ……:	AOC250613007ER
Compiled by (print+ signature) …….:	Bruce Lin
Approved by (print+ signature) ……..…:	Robin Liu
Date of issue……...:	2025-06-18

Lab Supervisor

Testing Laboratory.....:	Shenzhen AOCE Electronic Technology Service Co., Ltd
Address……:	Room 202, 2nd Floor, No.12th Building of Xinhe Tongfuyu Industrial Park, Fuhai Street, Baoan District, Shenzhen, Guangdong, China
Testing location/address……...:	Same as above
Applicant's name.....:	Guangdong Well-born Electric Appliance Co., Ltd.
Address……:	No. 15 HuaTian Road, South First Road, Ronggui, Shunde, Foshan, Guangdong
Manufacturer name……..:	Guangdong Well-born Electric Appliance Co., Ltd.
Address……:	No. 15 HuaTian Road, South First Road, Ronggui, Shunde, Foshan, Guangdong
Factory name……...:	Guangdong Well-born Electric Appliance Co., Ltd.
Address……:	No. 15 HuaTian Road, South First Road, Ronggui, Shunde, Foshan, Guangdong
Test Object……:	Water Heater
Trade Mark……:	Well-born
Model / Type reference……:	NDT20E100-5
Rating(s)……:	220-240V~, 50/60Hz, 2000W
Test specification:	
Standard .....:	COMMISSION DELEGATED REGULATION (EU) No 812/2013; COMMISSION REGULATION (EU) No 814/2013; EN 50440:2015
Test procedure ..... :	Test report
Non-standard test method .....:	N/A
Test Report Form No......:	IECEE TRF No. (EU) No 814/2013
Test Report Form(s) Originator .....:	AOCE
Master TRF.....:	2019-11-30

Summary of Testing:	
Tests performed (name of test and test clause):	**Testing location:**
☐abweichung festgestellt / deviation(s) found ☐keine Abweichung festgestellt / no deviation(s) found Commission Delegated Regulation (EU) No 814/2013, (EU) No 812/2013, (EU) 2017/1369, No 1275/2008, EN 62301:2005	Shenzhen AOCE Electronic Technology Service Co., Ltd Room 202, 2nd Floor, No.12th Building of Xinhe Tongfuyu Industrial Park, Fuhai Street, Baoan District, Shenzhen, Guangdong, China

Possible Test Case Verdicts:	
Test case does not apply to the test object……:	N/A (Not Applicable)
Test object does meet the requirement……..…….:	P (Pass)
Test object does not meet the requirement……..:	F (Fail)
Testing:	
Ambient temperature of tested ..... :	20.0℃
Test inputs..... :	230V~
Sample size for tested ..... :	1 pcs
Date of receipt of test item……..…..:	2025-05-14
Date (s) of performance of tests……:	2025-05-14 to 2025-06-16
General Remarks:	
Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or use in part without prior written consent from Shenzhen AOCE Electronic Technology Service Co., Ltd	
Copy of marking plate:	
N/A	
Characteristic data:	
(not shown on the marking plate) Dimensions: -- Weight (kg): --kg	

REGULATION (EU) No 814/2013			
Clause	Requirement + Test	Result – Remark	Verdict

ANNEX II	Ecodesign requirements		P
1.	ECODESIGN REQUIREMENTS FOR WATER HEATERS		P
1.1	Requirements for water heating energy efficiency		P
	a) From 26 September 2015 the water heating energy efficiency of water heaters shall not fall below the following values:		N/A

Declared load profile	3XS	XXS	XS	S	M	L	XL	XXL	3XL	4XL
Water heating energy efficiency	22 %	23 %	26 %	26 %	30 %	30 %	30 %	32 %	32 %	32 %
In addition, for water heaters with *smart* being declared as '1': water heating energy efficiency calculated for *smart* = 0, tested under the declared load profile	19 %	20 %	23 %	23 %	27 %	27 %	27 %	28 %	28 %	28 %

	b) From 26 September 2017 the water heating energy efficiency of water heaters shall not fall below the following values:									P

Declared load profile	3XS	XXS	XS	S	M	L	XL	XXL	3XL	4XL
Water heating energy efficiency	32 %	32 %	32 %	32 %	36 %	37 %	37 %	37 %	37 %	38 %
In addition, for water heaters with *smart* being declared as '1': water heating energy efficiency calculated for *smart* = 0, tested under the declared load profile	29 %	29 %	29 %	29 %	33 %	34 %	35 %	36 %	36 %	36 %

	c) From 26 September 2018 the water heating energy efficiency of water heaters shall not fall below the following values:			N/A

Declared load profile	XXL	3XL	4XL
Water heating energy efficiency	60 %	64 %	64 %

1.2	Requirements for storage volume of storage water heaters with declared load profiles 3XS, XXS, XS and S From 26 September 2015:		N/A
	(a) for storage water heaters with declared load profile 3XS the storage volume shall not exceed 7 litres		N/A
	b) for storage water heaters with declared load profiles XXS and XS, the storage volume shall not exceed 15 litres		N/A
	c) for storage water heaters with declared load profile S the storage volume shall not exceed 36 litres		N/A

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Clause	Requirement + Test	Result – Remark	Verdict

1.3	Requirements for mixed water at 40 °C of storage water heaters with declared load profiles M, L, XL, XXL, 3XL and 4XL From 26 September 2015 the amount of mixed water at 40 °C shall not fall below the following values: **Declared load profile** | **M** | **L** | **XL** | **XXL** | **3XL** | **4XL** Mixed water at 40 °C | 65 litres | 130 litres | 210 litres | 300 litres | 520 litres | 1 040 litres		P
1.4	Requirements for sound power level From 26 September 2015 the sound power level of heat pump water heaters shall not exceed the following values: Rated heat output ≤ 6 kW: Sound power level (L_{WA}), indoors: 60 dB; Sound power level (L_{WA}), outdoors: 65 dB Rated heat output > 6 kW and ≤ 12 kW: Sound power level (L_{WA}), indoors: 65 dB; Sound power level (L_{WA}), outdoors: 70 dB Rated heat output > 12 kW and ≤ 30 kW: Sound power level (L_{WA}), indoors: 70 dB; Sound power level (L_{WA}), outdoors: 78 dB Rated heat output > 30 kW and ≤ 70 kW: Sound power level (L_{WA}), indoors: 80 dB; Sound power level (L_{WA}), outdoors: 88 dB		N/A
1.5	Requirements for emissions of nitrogen oxides		N/A
	a) From 26 September 2018 emissions of nitrogen oxides, expressed in nitrogen dioxide, of water heaters shall not exceed the following values: — conventional water heaters using gaseous fuels: 56 mg/kWh fuel input in terms of GCV, — conventional water heaters using liquid fuels: 120 mg/kWh fuel input in terms of GCV, — heat pump water heaters equipped with external combustion using gaseous fuels and solar water heaters using gaseous fuels: 70 mg/kWh fuel input in terms of GCV, — heat pump water heaters equipped with external combustion using liquid fuels and solar water heaters using liquid fuels: 120 mg/kWh fuel input in terms of GCV, — heat pump water heaters equipped with an internal combustion engine using gaseous fuels: 240 mg/kWh fuel input in terms of GCV, — heat pump water heaters equipped with an internal combustion engine using liquid fuels: 420 mg/kWh fuel input in terms of GCV.		N/A
1.6	Requirements for product information related to water heaters		N/A
	From 26 September 2015 the instruction manuals for installers and end-users, free access websites of manufacturers, their authorised representatives and importers and technical documentation for the purposes of conformity assessment pursuant to Article 4 shall contain the following elements:		N/A

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Clause	Requirement + Test	Result – Remark	Verdict
	(a) information identifying the model(s), including equivalent models, to which the information relates;		N/A
	b) the results of the measurements for the technical parameters specified in point 6 of Annex III; EN 6.9.2013 Official Journal of the European Union L 239/171		N/A
	c) the results of the calculations for the technical parameters specified in point 2 of Annex IV;		N/A
	d) any specific precautions that shall be taken when the water heater is assembled, installed or maintained;		N/A
	e) for heat generators designed for water heaters and water heater housings to be equipped with such heat generators, their characteristics, the requirements for assembly, to ensure compliance with the ecodesign requirements for water heaters and, where appropriate, the list of combinations recommended by the manufacturer;		N/A
	f) information relevant for disassembly, recycling and/or disposal at end-of-life.		N/A
2.	ECODESIGN REQUIREMENTS FOR HOT WATER STORAGE TANKS		N/A
2.1	Requirement for standing loss		N/A
	From 26 September 2017 the standing loss S of hot water storage tanks with storage volume V, expressed in litres, shall not exceed the following limit: $16,66+8,33 \cdot V^{0,4}$ Watts		N/A
2.2	Requirements for product information related to hot water storage tanks		N/A
	From 26 September 2015 the instruction manuals for installers and end-users, the free access websites of manufacturers, their authorised representatives and importers and technical documentation for the purposes of conformity assessment pursuant to Article 4 shall contain the following elements:		N/A
	(a) information identifying the model(s), including equivalent models, to which the information relates		N/A
	b) the results of the measurements for the technical parameters specified in point 7 of Annex III		N/A
	c) any specific precautions that shall be taken when the hot water storage tank is assembled, installed or maintained		N/A
	d) information relevant for disassembly, recycling and/or disposal at end-of-life.		N/A
ANNEX III	Measurements		P

REGULATION (EU) No 814/2013			
Clause	Requirement + Test	Result – Remark	Verdict
1.	For the purposes of compliance and verification of compliance with the requirements of this Regulation, measurements shall be made using harmonised standards the reference numbers of which have been published for this purpose in the Official Journal of the European Union, or using other reliable, accurate and reproducible methods that take into account the generally recognised state-of-the-art methods. They shall meet the conditions and technical parameters set out in points 2 to 7.		P
2.	GENERAL CONDITIONS FOR TESTING WATER HEATERS		P
	a) Measurements shall be carried out using the load profiles set out in Table 1;		P
	b) measurements shall be carried out using a 24-hour measurement cycle as follows: — 00:00 to 06:59: no water draw-off, — from 07:00: water draw-offs according to the declared load profile, — from end of last water draw-off until 24:00: no water draw-off;		P
	c) the declared load profile shall be the maximum load profile or the load profile one below the maximum load profile;		P
	d) any heat generator designed for a water heater, and any water heater housing to be equipped with such a heat generator, shall be tested with an appropriate water heater housing and heat generator, respectively;		P
	e) water heaters to be classified as off-peak water heaters are energised for a maximum period of 8 consecutive hours between 22:00 and 07:00 of the 24-hour tapping pattern. At the end of the 24-hour tapping pattern the water heaters are energised till the end of the step.		N/A

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Clause	Requirement + Test	Result – Remark	Verdict

3.	CONDITIONS FOR TESTING THE SMART CONTROL COMPLIANCE (SMART) OF WATER HEATERS Where the manufacturer deems it appropriate to declare the value of smart as being '1', measurements of the weekly electricity and/or fuel consumption with or without smart controls shall be carried out using a two-week measurement cycle as follows: — days 1 to 5: random sequence of load profiles chosen from the declared load profile and the load profile one below the declared load profile, and smart control disabled, — days 6 and 7: no water draw-offs, and smart control disabled, — days 8 to 12: repetition of the same sequence applied for days 1 to 5, and smart control enabled, — days 13 and 14: no water draw-offs, and smart control enabled, — the difference between the useful energy content measured during days 1 to 7 and the useful energy content measured during days 8 to 14 shall not exceed 2 % of Q_{ref} of the declared load profile.		P
4.	CONDITIONS FOR TESTING SOLAR WATER HEATERS The solar collector, solar hot water storage tank, pump in the collector loop (if applicable) and heat generator shall be tested separately. Where the solar collector and solar hot water storage tank cannot be tested separately, they shall be tested in combination. The heat generator shall be tested under the conditions set out in point 2 of this Annex. The results shall be used for the calculations set out in point 3(b) of Annex IV under the conditions set out in Tables 2 and 3. For the purpose of establishing Q_{tota} the efficiency of the heat generator using the Joule effect in electric resistance heating elements is assumed to be 100/CC.		P
5.	5. CONDITIONS FOR TESTING HEAT PUMP WATER HEATERS — Heat pump water heaters shall be tested under the conditions set out in Table 4; — heat pump water heaters which use ventilation exhaust air as the heat source shall be tested under the conditions set out in Table 5.		N/A
	Table 2 **Average daytime temperature [°C]**		N/A

	January	February	March	April	May	June	July	August	September	October	November	December
Average climate conditions	2,8	2,6	7,4	12,2	16,3	19,8	21,0	22,0	17,0	11,9	5,6	3,2

REGULATION (EU) No 814/2013			
Clause	Requirement + Test	Result – Remark	Verdict

	Table 3 **Average global solar irradiance [W/m²]** January: Average climate conditions 70; February 104; March 149; April 192; May 221; June 222; July 232; August 217; September 176; October 129; November 80; December 56		N/A
	Table 4 **Standard rating conditions for heat pump water heaters, temperatures in dry bulb air temperature (wet bulb air temperature indicated in brackets)** Heat source: Outdoor air; Indoor air; Exhaust air; Brine; Water Temperature: + 7 °C (+ 6 °C); + 20 °C (maximum + 15 °C); + 20 °C (+ 12 °C); 0 °C (inlet)/ – 3 °C (outlet); + 10 °C (inlet)/ + 7 °C (outlet)		N/A
	Table 5 **Maximum ventilation exhaust air available [m³/h], at a temperature of 20 °C and with humidity of 5,5 g/m³** Declared load profile: XXS; XS; S; M; L; XL; XXL; 3XL; 4XL Maximum ventilation exhaust air available: 109; 128; 128; 159; 190; 870; 1 021; 2 943; 8 830		N/A
6.	TECHNICAL PARAMETERS OF WATER HEATERS		P
	The following parameters shall be established for water heaters:		P
	a) the daily electricity consumption Q_{elec} in kWh, rounded to three decimal places;		P
	b) the declared load profile, expressed by the appropriate letter in accordance with Table 1 of this Annex;		P
	c) the sound power level L_{WA}, in dB, indoors, rounded to the nearest integer (for heat pump water heaters, if applicable); in addition, for water heaters using fossil and/or biomass fuels:		N/A
	d) the daily fuel consumption Q_{fuel} in kWh in terms of GCV, rounded to three decimal places;		N/A
	e) the emissions of nitrogen oxides, expressed in nitrogen dioxide, in mg/kWh fuel input in terms of GCV, rounded to the nearest integer; in addition, for water heaters for which the value of smart is declared as being '1'		N/A
	f) the weekly fuel consumption with smart controls $Q_{fuel, week, smart}$ in kWh in terms of GCV, rounded to three decimal places		N/A
	g) the weekly electricity consumption with smart controls $Q_{elec, week, smart}$ in kWh, rounded to three decimal places		P
	h) the weekly fuel consumption without smart controls $Q_{fuel, week}$ in kWh in terms of GCV, rounded to three decimal places		N/A

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Clause	Requirement + Test	Result – Remark	Verdict
	i) the weekly electricity consumption without smart controls Q_{elec}, week in kWh, rounded to three decimal places; in addition, for storage water heaters with declared load profiles 3XS, XXS and XS		P
	j) the storage volume V in litres, rounded to one decimal place; in addition, for storage water heaters with declared load profiles M, L, XL, XXL, 3XL and 4XL:		P
	k) the mixed water at 40 °C V40 in litres, rounded to the nearest integer		N/A
	in addition, for solar water heaters:		N/A
	(l) the collector aperture area A sol in m^2 , rounded to two decimal places		N/A
	m) the zero-loss efficiency η_0 , rounded to three decimal places		N/A
	n) the first-order coefficient a 1 in W/(m^2 K), rounded to two decimal places;		N/A
	o) the second-order coefficient a 2 in W/(m^2 K^2), rounded to three decimal places;		N/A
	p) the incidence angle modifier IAM, rounded to two decimal places;		N/A
	q) the pump power consumption solpump in W, rounded to two decimal places;		N/A
	r) the standby power consumption solstandby in W, rounded to two decimal places; in addition, for heat pump water heaters:		N/A
	s) the sound power level L_{WA} in dB, outdoors, rounded to the nearest integer.		N/A
7.	TECHNICAL PARAMETERS OF HOT WATER STORAGE TANKS		N/A
	The following parameters shall be established for hot water storage tanks:		N/A
	a) the storage volume V in litres, rounded to one decimal place;		N/A
	b) the standing loss S in W, rounded to one decimal place.		N/A
ANNEX IV	Calculations		P

REGULATION (EU) No 814/2013			
Clause	Requirement + Test	Result – Remark	Verdict
1.	For the purposes of compliance and verification of compliance with the requirements of this Regulation, calculations shall be made using harmonised standards the reference numbers of which have been published for this purpose in the Official Journal of the European Union, or using other appropriate calculation methods that take into account the generally recognised state-of-the-art methods. They shall meet the technical parameters and calculations set out in points 2 to 5.		P
	Technical parameters used for the calculations shall be measured in accordance with Annex III.		P
2.	TECHNICAL PARAMETERS OF WATER HEATERS		P
	The following parameters shall be calculated for water heaters under average climate conditions:		P
	a) the water heating energy efficiency η_{wh} in %, rounded to one decimal place;		P
	in addition, for solar water heaters under average climate conditions:		N/A
	b) the annual non-solar heat contribution Q_{nonsol} in kWh in terms		N/A
	c) the heat generator water heating energy efficiency $\eta_{wh, nonsol}$ in %, rounded to one decimal place;		N/A
	d) the annual auxiliary electricity consumption Q_{aux} in kWh, rounded to one decimal place.		N/A
3.	CALCULATION OF THE WATER HEATING ENERGY EFFICIENCY η_{wh}		P
	a) Conventional water heaters and heat pump water heaters		P
	The water heating energy efficiency is calculated as follows:		P
	$\eta_{wh} = \frac{Q_{ref}}{(Q_{fuel} + CC \cdot Q_{elec})(1 - SCF \cdot smart) + Q_{cor}}$		P
	For water-/brine-to-water heat pump water heaters, the electricity consumption of one or more ground water pumps shall be taken into account.		N/A
	b) Solar water heaters		N/A
	The water heating energy efficiency is calculated as follows:		N/A

REGULATION (EU) No 814/2013			
Clause	Requirement + Test	Result – Remark	Verdict
	$\eta_{wh} = \frac{0{,}6 \cdot 366 \cdot Q_{ref}}{Q_{tota}}$ Where: $Q_{tota} = \frac{Q_{nonsol}}{1{,}1 \cdot \eta_{wh,nonsol} - 0{,}1} + Q_{aux} \cdot CC$		N/A
4.	DETERMINATION OF THE SMART CONTROL FACTOR SCF AND OF SMART CONTROL COMPLIANCE smart		P
	a) The smart control factor is calculated as follows:		P
	$SCF = 1 - \frac{Q_{fuel,week,smart} + CC \cdot Q_{elec,week,smart}}{Q_{fuel,week} + CC \cdot Q_{elec,week}}$		P
	b) If SCF ≥ 0,07, the value of smart shall be 1. In all other cases, the value of smart shall be 0.		N/A
5.	The ambient correction term is calculated as follows:		P
	a) for conventional water heaters using electricity:		P
	$Q_{cor} = -k \cdot (CC \cdot (Q_{elec} \cdot (1 - SCF \cdot smart) - Q_{ref}))$		P
	b) for conventional water heaters using fuels:		N/A
	$Q_{cor} = -k \cdot (Q_{fuel} \cdot (1 - SCF \cdot smart) - Q_{ref})$		N/A
	c) for heat pump water heaters:		N/A
	$Q_{cor} = -k \cdot 24h \cdot P_{stby}$		N/A
	Where: the k-values are given in Table 6 for each load profile.		P
	Table 6 k-values 3XS | XXS | XS | S | M | L | XL | XXL | 3XL | 4XL k: 0,23 | 0,23 | 0,23 | 0,23 | 0,23 | 0,23 | 0,23 | 0,0 | 0,0 | 0,0		P

Test table

Table 1	Test parameters for measurements	P
The measurement method used	EN 50440:2015	
Rated input power (W)	2000W	
hot water storage volume (l)	80L	
Ambient temperature (°C):	20 °C	
Water supply θ_C and pressure	10°C /300kPa	
Test voltage in V:	230V	
Test frequency in Hz:	50Hz	
The declared load profiles of the water heater	M	
Test procedure for storage water heaters		
The test procedure for storage water heaters to establish the daily electricity consumption Q_{elec} during a 24-hour measurement cycle is the following		
a) Installation The product is installed in test environment according to manufacturer's instructions. Designated floor-standing appliances may be placed on the floor, on a stand supplied with the product, or on a platform for easy access. Wallmounted products are mounted on a panel at least 150 mm from any structural wall with a free space of at least 250 mm above and below the product and at least 700 mm to the sides. Products designated to be built-in are mounted according to manufacturer's instructions. The product is shielded from direct solar radiation.		
b) Stabilisation The product is kept at ambient conditions until all parts of the product have reached ambient conditions±2K, at least 24 hours for storage type products.		
c) Filling and heat-up The product is filled with cold water. Filling stops at the applicable cold water pressure. The product is energized in „out of the box-mode" to reach its operating temperature, controlled by the product's own means of control (thermostat). The next stage starts at thermostat cut out.		
d) Stabilisation at zero-load The product is kept at this condition, without draw-offs during at least 12 hours. Subject to a control cycle this stage ends — and next stage starts — at the first thermostat cut-out after 12 hours. During this stage,		
e) Water draw-offs For the declared load profile, draw-offs are made in accordance with the specifications of the appropriate 24 h tapping pattern. This stage starts directly after thermostat cut out from stabilisation part with the first tapping at the time-value according to the appropriate tapping load profile (see Regulation (EU) No 814/2013, Annex III point 2 and Delegated Regulation (EU) No 812/2013, Annex VII point (2). From end of last water draw-off until 24:00, no water is tapped. During the water draw-offs relevant technical parameters (power, temperature, etc.) are established. For dynamic parameters the overall sample rate is 60 s or less. During draw-offs the recommended sample rate is 5 s or less. The electricity consumption over the 24-hour measurement cycle, Qtestelec is corrected as specified in point (h).		
f) Re-stabilisation at zero-load The product is kept at nominal operating conditions without draw-offs during at least 12 hours. Subject to a control cycle this stage ends at the first thermostat cut-out after 12 hours. During this stage the total fuel consumption in kWh in terms of GCV, the total electricity consumption in kWh final energy and the exact time elapsed in hours are recorded.		
g) Mixed water at 40 °C (V_{40})		

Test table

Mixed water at 40 °C (V_{40}) is the quantity of water at 40 °C, which has the same heat content (enthalpy) as the hot water which is delivered above 40 °C at the output of the water heater, expressed in litres.
Immediately following measurement according to point (f) a quantity of water is withdrawn through the outlet
by supplying cold water. The flow of water from open outlet water heaters is controlled by the inlet valve. The
flow in any other type of water heaters is controlled by means of a valve fitted in the outlet or the inlet. The measurement is ended when the outlet temperature drops below 40 °C.
The rate of flow is adjusted to the maximum value according to the declared load profile
The normalised value of the average temperature is calculated according to the following equation:

$$\theta_p\,[°C] = \left(T_{set} - 10\right) \times \frac{\left(\theta'_p - \theta_c\right)}{\left(T_{set} - \theta_c\right)} + 10$$

T_{set} [°C] is the water temperature, without withdrawal of water, measured with a thermocouple placed inside the upper section of the tank. For metal tanks the thermocouple may be placed on the outer surface of the tank as well. This value is the water temperature measured after the last cut-out of the thermostat during the "Re-stabilization at zero-load" step.

θ_c [°C] is the average temperature of inlet cold water during the test.

θ'_p [°C] is the average temperature of outlet water and its normalized value is named θ_p [°C]; it is to be calculated in according to the following formula:

NOTE Temperature readings are preferable taken continuously. Alternatively, they may be taken at equal intervals evenly spread over the discharge, for example every 5 litres (maximum). If there is a sharp drop in temperature, additional readings may be necessary in order to correctly calculate the average value θ_p.

Outlet water temperature shall always be ≥ 40 °C which is to be taken into account for the calculation of θ_p.
The volume V_{40_exp} [litres] which corresponds to the quantity of water delivered at least 40 °C is to be considered.
Quantity of hot water V_{40} [litres] delivered with a temperature of at least 40 °C will be calculated by the following equation:

$$V_{40}\,[litres] = V_{40\,exp} \cdot \frac{\left(\theta_p - 10\right)}{30}$$

$Q_{testelec}$ shall be corrected for any energy surplus or deficit outside the strict 24 h tapping period, i.e. a possible energy difference before and after the tapping cycle is taken into account. Furthermore, any surplus or deficit in the delivered useful energy content of the hot water is taken into account in the following equations for Q_{elec}.

$$Q_{elec} = \left(\frac{Q_{ref}}{Q_{H2O}}\right) \times \left\{Q_{testelec} + \frac{1{,}163 \times C_{act} \times \left(T_3(t_3) - T_5(t_5)\right)}{1000}\right\} \text{ [kWh]}$$

Where:
— Q_{H2O} in kWh is the useful energy content of the hot water drawn-off,
—T3 and T5 are water temperatures measured at the dome of water heater, respectively at the beginning (t_3)
and at the end (t_5) of the 24 h measurement cycle
—C_{act} in litres is the actual capacity of water heater. C_{act} is measured as stated in following

Filling and storage volume (actual capacity C_{act})
The volume of the tank is measured as follows.
The empty water heater is to be weighted; the weight of taps on inlet and/or outlet pipes shall be considered.
Then the storage water heater is filled with cold water in accordance with the manufacturer's instruction at cold water pressure. The water supply is then cut off.
The filled water heater is to be weighted.
The difference of the two weights (m_{act}) is to be converted into the volume in litres (C_{act}).

$$C_{act} = \frac{m_{act}}{0.9997}$$

This volume is to be reported in litres to the nearest one-tenth litres. The measured value (C_{act}) shall not be

Test table

more than 2 % lower than the rated value.	
The sum of the useful energy content of water draw-offs (Q_{ref}), expressed in kWh, in Table 1:	5,845kWh
Sum of energy contents of water draw-offs(Q_{H2O}), expressed in kWh, in Table 1:	6,863kWh
The water temperatures T_3, in °C:	64,7 °C
The water temperatures T_5, in °C:	63,3 °C
The measured value (C_{act}) in litres:	80,1L
The electricity consumption over the 24-hour measurement cycle, $Q_{testelec}$ in kWh:	6,911kWh
The consumption of electricity over 24 consecutives hours under the declared load profile (Q_{elec}), expressed in kWh in terms of final energy:	6,993kWh
Sequence of SMART tapping cycles used during the test	Refer to user manual
Useful energy content of the hot water drawn-off during reference period $Q_{H2O}^{reference}$ expressed in kWh:	23,158
Useful energy content of the hot water drawn-off during smart period Q_{H2O}^{smart} expressed in kWh:	22,033
The weekly electricity consumption with smart controls $Q_{elec, week, smart}$ in kWh:	35,89
the weekly electricity consumption without smart controls $Q_{elec, week}$ in kWh:	30,85
The smart control factor SCF in %:	14,05
The water temperature Tset in °C:	64,7
The average temperature of inlet cold water during the test θ c in °C:	6,5
The average temperature of outlet water θ p in °C:	63,3
Mixed water at 40 °C (V_{40}) in litres:	157,6

Test table

Information of efficiency class according to (EU) No 812/2013		
Item	Measured value	Verdict
Declared load profile	M	Pass
Water heating energy efficiency class, categorised by declared load profiles η_{wh} in %	39,1%	B
Smart value	1	--
Annual electricity consumption in kWh	1311,6kWh	--

Water heating energy efficiency classes of water heaters, categorised by declared load profiles, η_{wh} in %

	3XS	XXS	XS	S	M	L	XL	XXL
A^{+++}	$\eta_{wh} \geq 62$	$\eta_{wh} \geq 62$	$\eta_{wh} \geq 69$	$\eta_{wh} \geq 90$	$\eta_{wh} \geq 163$	$\eta_{wh} \geq 188$	$\eta_{wh} \geq 200$	$\eta_{wh} \geq 213$
A^{++}	$53 \leq \eta_{wh} < 62$	$53 \leq \eta_{wh} < 62$	$61 \leq \eta_{wh} < 69$	$72 \leq \eta_{wh} < 90$	$130 \leq \eta_{wh} < 163$	$150 \leq \eta_{wh} < 188$	$160 \leq \eta_{wh} < 200$	$170 \leq \eta_{wh} < 213$
A^{+}	$44 \leq \eta_{wh} < 53$	$44 \leq \eta_{wh} < 53$	$53 \leq \eta_{wh} < 61$	$55 \leq \eta_{wh} < 72$	$100 \leq \eta_{wh} < 130$	$115 \leq \eta_{wh} < 150$	$123 \leq \eta_{wh} < 160$	$131 \leq \eta_{wh} < 170$
A	$35 \leq \eta_{wh} < 44$	$35 \leq \eta_{wh} < 44$	$38 \leq \eta_{wh} < 53$	$38 \leq \eta_{wh} < 55$	$65 \leq \eta_{wh} < 100$	$75 \leq \eta_{wh} < 115$	$80 \leq \eta_{wh} < 123$	$85 \leq \eta_{wh} < 131$
B	$32 \leq \eta_{wh} < 35$	$32 \leq \eta_{wh} < 35$	$35 \leq \eta_{wh} < 38$	$35 \leq \eta_{wh} < 38$	$39 \leq \eta_{wh} < 65$	$50 \leq \eta_{wh} < 75$	$55 \leq \eta_{wh} < 80$	$60 \leq \eta_{wh} < 85$
C	$29 \leq \eta_{wh} < 32$	$29 \leq \eta_{wh} < 32$	$32 \leq \eta_{wh} < 35$	$32 \leq \eta_{wh} < 35$	$36 \leq \eta_{wh} < 39$	$37 \leq \eta_{wh} < 50$	$38 \leq \eta_{wh} < 55$	$40 \leq \eta_{wh} < 60$
D	$26 \leq \eta_{wh} < 29$	$26 \leq \eta_{wh} < 29$	$29 \leq \eta_{wh} < 32$	$29 \leq \eta_{wh} < 32$	$33 \leq \eta_{wh} < 36$	$34 \leq \eta_{wh} < 37$	$35 \leq \eta_{wh} < 38$	$36 \leq \eta_{wh} < 40$
E	$22 \leq \eta_{wh} < 26$	$23 \leq \eta_{wh} < 26$	$26 \leq \eta_{wh} < 29$	$26 \leq \eta_{wh} < 29$	$30 \leq \eta_{wh} < 33$	$30 \leq \eta_{wh} < 34$	$30 \leq \eta_{wh} < 35$	$32 \leq \eta_{wh} < 36$
F	$19 \leq \eta_{wh} < 22$	$20 \leq \eta_{wh} < 23$	$23 \leq \eta_{wh} < 26$	$23 \leq \eta_{wh} < 26$	$27 \leq \eta_{wh} < 30$	$27 \leq \eta_{wh} < 30$	$27 \leq \eta_{wh} < 30$	$28 \leq \eta_{wh} < 32$
G	$\eta_{wh} < 19$	$\eta_{wh} < 20$	$\eta_{wh} < 23$	$\eta_{wh} < 23$	$\eta_{wh} < 27$	$\eta_{wh} < 27$	$\eta_{wh} < 27$	$\eta_{wh} < 28$

Ecodesign requirements according to (EU) No 814/2013				P
Model name	NDT20E100-5			
Declared load profile	M			
Items	Measured value	Stage 1	Stage 2	Verdict
Water heating energy η wh in %	39,1%	⩾30% (From 26 September 2015)	⩾36% (From 26 September 2017)	P
Storage volume in litres	80,1L	Not be more than 2 % lower than the rated value: ⩾78,4L		P
Mixed water at 40 °C in litres	157,6	≥65 litres		P

Product Photo

Fig. 1 – Overview

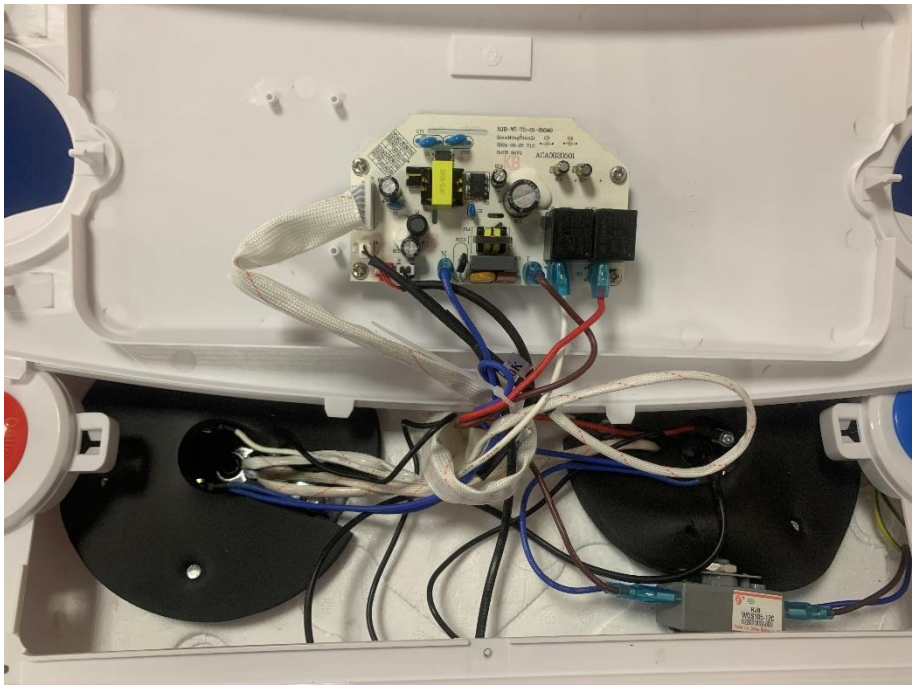

Fig. 2 – Internal view

Fig. 3 – Plug view

***** End of Report *****