Heat pump ERP Test Report

Report Number	4394367.45
Tested by (name + signature)	Elvis Chen
Approved by (name + signature)	Jacky Zhang
Date of issue	
Total number of pages	Pages
Testing Laboratory	DEKRA Testing and Certification (Shanghai) Ltd., Guangzhou branch
Address	Block 5, No.3, Qiyun Road, Huangpu District, Guangzhou, Guangdong, China
Applicant's name	Guangzhou Mango Energy Technology Co., Ltd
Address	1F,Building C Haihe Industrial Zone,No.10 Dongsheng Road Xinya Street,Huadou District,Guangzhou City,Guangdong Province ,China
Test specification:	
Standard	EN 14825:2018, EN 14511-1/2/3/4:2018
Test procedure	(EU) No 811/2013, (EU) No 813/2013, EU 2017/254, EU 2016/2282
Non-standard test method	N/A
Test Report Form No.	EN 14825 heat pump air to water
Test Report Form(s) Originator	DEKRA Guangzhou
Test item description	Heat pump
Trade Mark	Mango Energy
Manufacturer	Same as applicant
Factory	Same as applicant
Model/Type reference	MGSDC-030IIC
Ratings	220 V 1N~, 50 Hz, R32/1200g, see rating label

Summary of testing:
Tests performed (Test items): Heating capacity
Testing location: Foshan QiCe Testing Technical Service Co., Ltd. 1/F, of No.2 Jusheng Road, Ronggui Hongxing Residential Committee, Shunde, Foshan, Guangdong, China

Copy of marking plate:

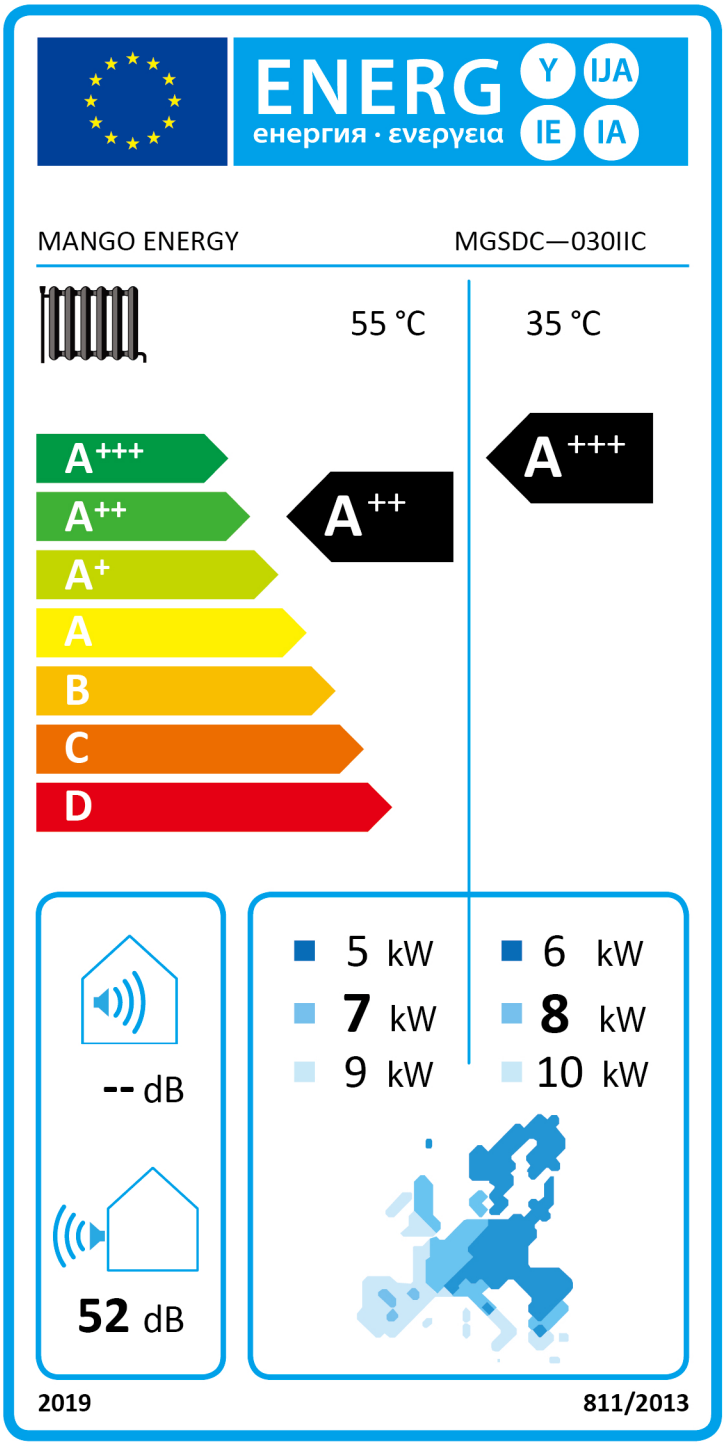
The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

Mango Energy

DC Inverter Air - Water Heat Pump

Model	MGSDC-030IIC
Power Supply	220V~50Hz/1Ph
Heating(air-10℃/water35℃)	
Heating Capacity	8.0kW
Rated Input Power	2.84kW
COP	2.82W/W
Hot water(air-10℃/water55℃)	
Heating Capacity	7.0kW
Rated Input Power	3.29kW
COP	2.13W/W
Cooling(air+35℃/water7℃)	
Cooling Capacity	7.0kW
Rated Input Power	2.52kW
EER	2.78W/W
Max.Input Power	3.5kW
Max.Current	15.0A
Max.Pressure	4. 2Mpa
Min.Pressure	2. 1Mpa
Refrigerant	R32/1200g
Water flow	≥1. 20m³/h
Water pressure drop	≦35kpa
Water pipe size	DN 25
Water Proof Class	IPX4
Noise	≦52.0dB(A)
Size(WxDxH)	925x375x770(mm)
Net Weight	76.0kg

Rating label



Energy label

Test item particulars ..... :	
Classification of installation and use ..... :	Fixed appliance
Supply Connection ..... :	Non-detachable power supply cord with plug

Possible test case verdicts:	
- test case does not apply to the test object..... :	N/A
- test object does meet the requirement ..... :	P (Pass)
- test object does not meet the requirement ..... :	F (Fail)
Testing ..... :	
Date of receipt of test item ..... :	2022-08-26
Date (s) of performance of tests..... :	2022-08-26 to 2022-09-02

General remarks:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
"(see Enclosure #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.

Throughout this report, a dot is used as the decimal separator.

The measurement result is considered in conformance with the requirement if it is within the prescribed limit, It is not necessary to calculate the uncertainty associated with the measurement result.
The test results presented in this report relate only to the object tested.
The information provided by the customer in this report may affect the validity of the results, the test lab is not responsible for it.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
This report is not used for social proof function in China market.

General product information:	
Model number of Unit Under Test	MGSDC-030IIC
Power Supply	single-phase
Refrigerant	R32
Heat Source (Heating Mode)	air
Heat Sink	Water
Does this heat pump have a variable output compressor?	Yes
Type of compressor	inverter

Clause	(EU) No 813/2013 - Ecodesign requirements	Result - Remark	Verdict
1	REQUIREMENTS FOR SEASONAL SPACE HEATING ENERGY EFFICIENCY		-
(a)	From 26 September 2015 the seasonal space heating energy efficiency and useful efficiencies of heaters shall not fall below the following values:		-
	Fuel boiler space heaters with rated heat output ⩽ 70 kW and fuel boiler combination heaters with rated heat output ⩽ 70 kW, with the exception of type B1 boilers with rated heat output ⩽ 10 kW and type B1 combination boilers with rated heat output ⩽ 30 kW: The seasonal space heating energy efficiency shall not fall below 86 %.		N/A
	Type B1 boilers with rated heat output ⩽ 10 kW and type B1 combination boilers with rated heat output ⩽ 30 kW: The seasonal space heating energy efficiency shall not fall below 75 %.		N/A
	Fuel boiler space heaters with rated heat output > 70 kW and ⩽ 400 kW and fuel boiler combination heaters with rated heat output > 70 kW and ⩽ 400 kW: The useful efficiency at 100 % of the rated heat output shall not fall below 86 %, and the useful efficiency at 30 % of the rated heat output shall not fall below 94 %.		N/A
	Electric boiler space heaters and electric boiler combination heaters: The seasonal space heating energy efficiency shall not fall below 30 %.		N/A
	Cogeneration space heaters: The seasonal space heating energy efficiency shall not fall below 86 %.		N/A
	Heat pump space heaters and heat pump combination heaters, with the exception of low-temperature heat pumps: The seasonal space heating energy efficiency shall not fall below 100 %.		P
	Low-temperature heat pumps: The seasonal space heating energy efficiency shall not fall below 115 %.		N/A
(b)	From 26 September 2017 the seasonal space heating energy efficiency of electric boiler space heaters, electric boiler combination heaters, cogeneration space heaters, heat pump space heaters and heat pump combination heaters shall not fall below the following values:		-
	Electric boiler space heaters and electric boiler combination heaters: The seasonal space heating energy efficiency shall not fall below 36 %.		N/A
	Cogeneration space heaters: The seasonal space heating energy efficiency shall not fall below 100 %.		N/A
	Heat pump space heaters and heat pump combination heaters, with the exception of low-temperature		P

<table>
<tr><th>Clause</th><th>(EU) No 813/2013 - Ecodesign requirements</th><th>Result - Remark</th><th>Verdict</th></tr>
<tr><td></td><td>heat pumps:
The seasonal space heating energy efficiency shall not fall below 110 %.</td><td></td><td></td></tr>
<tr><td></td><td>Low-temperature heat pumps:
The seasonal space heating energy efficiency shall not fall below 125 %.</td><td></td><td>N/A</td></tr>
<tr><td>2</td><td>REQUIREMENTS FOR WATER HEATING ENERGY EFFICIENCY</td><td></td><td>-</td></tr>
<tr><td>(a)</td><td>From 26 September 2015 the water heating energy efficiency of combination heaters shall not fall below the following values:
<table>
<tr><td>Declared load profile</td><td>3XS</td><td>XXS</td><td>XS</td><td>S</td><td>M</td><td>L</td><td>XL</td><td>XXL</td><td>3XL</td><td>4XL</td></tr>
<tr><td>Water heating energy efficiency</td><td>22 %</td><td>23 %</td><td>26 %</td><td>26 %</td><td>30 %</td><td>30 %</td><td>30 %</td><td>32 %</td><td>32 %</td><td>32 %</td></tr>
</table></td><td></td><td>N/A</td></tr>
<tr><td>(b)</td><td>From 26 September 2017 the water heating energy efficiency of combination heaters shall not fall below the following values:
<table>
<tr><td>Declared load profile</td><td>3XS</td><td>XXS</td><td>XS</td><td>S</td><td>M</td><td>L</td><td>XL</td><td>XXL</td><td>3XL</td><td>4XL</td></tr>
<tr><td>Water heating energy efficiency</td><td>32 %</td><td>32 %</td><td>32 %</td><td>32 %</td><td>36 %</td><td>37 %</td><td>38 %</td><td>60 %</td><td>64 %</td><td>64 %</td></tr>
</table></td><td></td><td>N/A</td></tr>
<tr><td>3</td><td>REQUIREMENTS FOR SOUND POWER LEVEL</td><td></td><td>Not check</td></tr>
<tr><td></td><td>From 26 September 2015 the sound power level of heat pump space heaters and heat pump combination heaters shall not exceed the following values:
<table>
<tr><td colspan="2">Rated heat output ≤ 6 kW</td><td colspan="2">Rated heat output > 6 kW and ≤ 12 kW</td><td colspan="2">Rated heat output > 12 kW and ≤ 30 kW</td><td colspan="2">Rated heat output > 30 kW and ≤ 70 kW</td></tr>
<tr><td>Sound power level (L_{WA}), indoors</td><td>Sound power level (L_{WA}), outdoors</td><td>Sound power level (L_{WA}), indoors</td><td>Sound power level (L_{WA}), outdoors</td><td>Sound power level (L_{WA}), indoors</td><td>Sound power level (L_{WA}), outdoors</td><td>Sound power level (L_{WA}), indoors</td><td>Sound power level (L_{WA}), outdoors</td></tr>
<tr><td>60 dB</td><td>65 dB</td><td>65 dB</td><td>70 dB</td><td>70 dB</td><td>78 dB</td><td>80 dB</td><td>88 dB</td></tr>
</table></td><td></td><td>Not check</td></tr>
<tr><td>4</td><td>REQUIREMENTS FOR EMISSIONS OF NITROGEN OXIDES</td><td></td><td>N/A</td></tr>
<tr><td>(a)</td><td>From 26 September 2018 emissions of nitrogen oxides, expressed in nitrogen dioxide, of heaters shall not exceed the following values:</td><td></td><td>N/A</td></tr>
<tr><td></td><td>fuel boiler space heaters and fuel boiler combination heaters using gaseous fuels: 56 mg/kWh fuel input in terms of GCV;</td><td></td><td>N/A</td></tr>
<tr><td></td><td>fuel boiler space heaters and fuel boiler combination heaters using liquid fuels: 120 mg/kWh fuel input in terms of GCV;</td><td></td><td>N/A</td></tr>
<tr><td></td><td>cogeneration space heaters equipped with external combustion using gaseous fuels: 70 mg/kWh fuel input in terms of GCV;</td><td></td><td>N/A</td></tr>
<tr><td></td><td>cogeneration space heaters equipped with external combustion using liquid fuels: 120 mg/kWh fuel input in terms of GCV;</td><td></td><td>N/A</td></tr>
<tr><td></td><td>cogeneration space heaters equipped with an internal combustion engine using gaseous fuels: 240 mg/kWh fuel input in terms of GCV;</td><td></td><td>N/A</td></tr>
</table>

Clause	(EU) No 813/2013 - Ecodesign requirements	Result - Remark	Verdict
	cogeneration space heaters equipped with an internal combustion engine using liquid fuels: 420 mg/kWh fuel input in terms of GCV;		N/A
	heat pump space heaters and heat pump combination heaters equipped with external combustion using gaseous fuels: 70 mg/kWh fuel input in terms of GCV;		N/A
	heat pump space heaters and heat pump combination heaters equipped with external combustion using liquid fuels: 120 mg/kWh fuel input in terms of GCV;		N/A
	heat pump space heaters and heat pump combination heaters equipped with an internal combustion engine using gaseous fuels: 240 mg/kWh fuel input in terms of GCV;		N/A
	heat pump space heaters and heat pump combination heaters equipped with an internal combustion engine using liquid fuels: 420 mg/kWh fuel input in terms of GCV.		N/A
5	REQUIREMENTS FOR PRODUCT INFORMATION		-
	From 26 September 2015 the following product information on heaters shall be provided:		-
(a)	the instruction manuals for installers and end-users, and free access websites of manufacturers, their authorised representatives and importers shall contain the following elements:		-
	for boiler space heaters, boiler combination heaters and cogeneration space heaters, the technical parameters set out in Table 1, measured and calculated in accordance with Annex III;		N/A
	for heat pump space heaters and heat pump combination heaters, the technical parameters set out in Table 2, measured and calculated in accordance with Annex III;		P
	any specific precautions that shall be taken when the heater is assembled, installed or maintained		P
	for type B1 boilers and type B1 combination boilers, their characteristics and the following standard text: ‘This natural draught boiler is intended to be connected only to a flue shared between multiple dwellings in existing buildings that evacuates the residues of combustion to the outside of the room containing the boiler. It draws the combustion air directly from the room and incorporates a draught diverter. Due to lower efficiency, any other use of this boiler shall be avoided and would result in higher energy consumption and higher operating costs.		N/A
	for heat generators designed for heaters, and heater housings to be equipped with such heat generators, their characteristics, the requirements for assembly, to ensure compliance with the ecodesign requirements for heaters and, where appropriate, the list of combinations recommended by the manufacturer		N/A
	information relevant for disassembly, recycling and/or disposal at end-of-life;		Not check

Clause	(EU) No 813/2013 - Ecodesign requirements	Result - Remark	Verdict
(b)	the technical documentation for the purposes of conformity assessment pursuant to Article 4 shall contain the following elements		-
	the elements specified in point (a)		P
	for heat pump space heaters and heat pump combination heaters where the information relating to a specific model comprising a combination of indoor and outdoor units has been obtained by calculation on the basis of design and/or extrapolation from other combinations, the details of such calculations and/or extrapolations, and of any tests undertaken to verify the accuracy of the calculations, including details of the mathematical model for calculating the performance of such combinations and details of the measurements taken to verify this model		P
(c)	the following information shall be durably marked on the heater		-
	if applicable, ‘type B1 boiler’ or ‘type B1 combination boiler		N/A
	for cogeneration space heaters, the electrical capacity.		N/A

(EU) No 813/2013 - Ecodesign requirements							
Table 2: Information requirements for heat pump space heaters and heat pump combination heaters							
Model(s)				MGSDC-030IIC			
Air-to-water heat pump				Yes			
Water-to-water heat pump:				No			
Brine-to-water heat pump				No			
Low-temperature heat pump				No			
Equipped with a supplementary heater				No			
Heat pump combination heater				No			
Parameters shall be declared for medium-temperature application, except for low-temperature heat pumps. For low- temperature heat pumps, parameters shall be declared for low-temperature application							
Parameters shall be declared for average climate conditions							
medium-temperature	Y			Average(mandatory)	Y		
Low-temperature	N			Wramer (if designated)	N		
				Colder (if designated)	N		
Item	Symbol	Value	Unit	Item	Symbol	Value	Unit
Rated heat output(*)	Prated	7	kW	Seasonal space heating energy efficiency	η s	133	%
Declared capacity for heating for part load at indoor temperature 20 °C and outdoor temperature T j				Declared coefficient of performance or primary energy ratio for part load at indoor temperature 20 °C and outdoor temperature T j			
Tj = – 7 °C	Pdh	6.25	kW	Tj = – 7 °C	COPd	2.58	—
Tj = 2 °C	Pdh	3.95	kW	Tj = 2 °C	COPd	3.51	—
Tj = 7 °C	Pdh	2.97	kW	Tj = 7 °C	COPd	4.89	—
Tj = 12 °C	Pdh	2.77	kW	Tj = 12 °C	COPd	7.35	—
Tj = bivalent temperature	Pdh	6.87	kW	Tj = bivalent temperature	COPd	2.13	—
Tj = operating limit	Pdh	6.25	kW	Tj = operating limit	COPd	2.58	—
For air-to-water heat pumps: T j = – 15 °C (if TOL < – 20 °C)	Pdh	N/A	kW	For air-to-water heat pumps: T j = – 15 °C (if TOL < – 20 °C)	COPd or PERd	N/A	-
Bivalent temperature	T biv	-7	°C	For air-to-water heat pumps: Operation limit temperature	TOL	-10	°C
Cycling interval capacity for heating	Pcych	N/A	kW	Cycling interval efficiency	COPcyc or PERcyc	N/A	%
Degradation co-efficient (**)	Cdh	0.9	-	Heating water operating limit temperature	WTOL	N/A	°C
Power consumption in modes other than active mode				Supplementary heater			

(EU) No 813/2013 - Ecodesign requirements							
Off mode	P_{OFF}	0.009	kW	Rated heat output (*)	Psup	0.15	kW
Thermostat-off mode	P_{TO}	0.049	kW				
Standby mode	P_{SB}	0.009	kW	Type of energy input	Electric		
Crankcase heater mode	P_{CK}	0.035	kW				
Other items							
Capacity control	-	variable		For air-to-water heat pumps: Rated air flow rate, outdoors	-	1.2	m^3/h
Sound power level, indoors/ outdoors	L_{WA}	-/52	dB	For water-/brine-to-water heat pumps: Rated brine or water flow rate, outdoor heat exchanger	-	N/A	m^3/h
Emissions of nitrogen oxides	NO_x	N/A	mg/kWh				
For heat pump combination heater:							
Declared load profile	N/A			Water heating energy efficiency	η_{wh}	N/A	%
Daily electricity consumption	Q_{elec}	N/A	kWh		Q_{fuel}	N/A	kWh
Contact details	Guangzhou Mango Energy Technology Co., Ltd 1F,Building C Haihe Industrial Zone,No.10 Dongsheng Road Xinya Street,Huadou District,Guangzhou City,Guangdong Province ,China						
(*) For heat pump space heaters and heat pump combination heaters, the rated heat output Prated is equal to the design load for heating Pdesignh, and the rated heat output of a supplementary heater Psup is equal to the supplementary capacity for heating sup(Tj). (**) If Cdh is not determined by measurement then the default degradation coefficient is Cdh = 0,9.							

<table>
<tr><th>Clause</th><th>Energy efficiency classes</th><th>Result - Remark</th><th>Verdict</th></tr>
<tr><td>1</td><td>SEASONAL SPACE HEATING ENERGY EFFICIENCY CLASSES</td><td></td><td>-</td></tr>
<tr><td></td><td>The seasonal space heating energy efficiency class of a heater, with the exception of low-temperature heat pumps and heat pump space heaters for low-temperature application, shall be determined on the basis of its seasonal space heating energy efficiency as set out in Table 1.
Table 1
Seasonal space heating energy efficiency classes of heaters, with the exception of low-temperature heat pumps and heat pump space heaters for low-temperature application
<table><tr><th>Seasonal space heating energy efficiency class</th><th>Seasonal space heating energy efficiency η_s in %</th></tr><tr><td>A^{+++}</td><td>$\eta_s \geq 150$</td></tr><tr><td>A^{++}</td><td>$125 \leq \eta_s < 150$</td></tr><tr><td>A^{+}</td><td>$98 \leq \eta_s < 125$</td></tr><tr><td>A</td><td>$90 \leq \eta_s < 98$</td></tr><tr><td>B</td><td>$82 \leq \eta_s < 90$</td></tr><tr><td>C</td><td>$75 \leq \eta_s < 82$</td></tr><tr><td>D</td><td>$36 \leq \eta_s < 75$</td></tr><tr><td>E</td><td>$34 \leq \eta_s < 36$</td></tr><tr><td>F</td><td>$30 \leq \eta_s < 34$</td></tr><tr><td>G</td><td>$\eta_s < 30$</td></tr></table></td><td></td><td>P</td></tr>
<tr><td></td><td>The seasonal space heating energy efficiency classes of a low-temperature heat pump and a heat pump space heater for low-temperature application shall be determined on the basis of its seasonal space heating energy efficiency as set out in Table 2.
Table 2
Seasonal space heating energy efficiency classes of low-temperature heat pumps and heat pump space heaters for low-temperature application
<table><tr><th>Seasonal space heating energy efficiency class</th><th>Seasonal space heating energy efficiency η_s in %</th></tr><tr><td>A^{+++}</td><td>$\eta_s \geq 175$</td></tr><tr><td>A^{++}</td><td>$150 \leq \eta_s < 175$</td></tr><tr><td>A^{+}</td><td>$123 \leq \eta_s < 150$</td></tr><tr><td>A</td><td>$115 \leq \eta_s < 123$</td></tr><tr><td>B</td><td>$107 \leq \eta_s < 115$</td></tr><tr><td>C</td><td>$100 \leq \eta_s < 107$</td></tr><tr><td>D</td><td>$61 \leq \eta_s < 100$</td></tr><tr><td>E</td><td>$59 \leq \eta_s < 61$</td></tr><tr><td>F</td><td>$55 \leq \eta_s < 59$</td></tr><tr><td>G</td><td>$\eta_s < 55$</td></tr></table></td><td></td><td>P</td></tr>
<tr><td></td><td>The seasonal space heating energy efficiency of a heater shall be calculated in accordance with points 3 and 4 of Annex VII, for heat pump space heaters, heat pump combination heaters and low-temperature heat pumps under average climate conditions</td><td></td><td>P</td></tr>
<tr><td>2</td><td>WATER HEATING ENERGY EFFICIENCY CLASSES</td><td></td><td>N/A</td></tr>
</table>

<table>
<tr><th>Clause</th><th>Energy efficiency classes</th><th>Result - Remark</th><th>Verdict</th></tr>
<tr><td></td><td>The water heating energy efficiency class of a combination heater shall be determined on the basis of its water heating
energy efficiency as set out in Table 3.</td><td></td><td>N/A</td></tr>
<tr><td></td><td>The water heating energy efficiency of a combination heater shall be calculated in accordance with point 5 of
Annex VII.</td><td></td><td>N/A</td></tr>
<tr><td></td><td>Table 3
Water heating energy efficiency classes of combination heaters, categorised by declared load profiles, η_{wh} in %
<table>
<tr><th></th><th>XXS</th><th>XXS</th><th>XS</th><th>S</th><th>M</th><th>L</th><th>XL</th><th>XXL</th></tr>
<tr><td>A^{+++}</td><td>$\eta_{wh} \geq 62$</td><td>$\eta_{wh} \geq 62$</td><td>$\eta_{wh} \geq 69$</td><td>$\eta_{wh} \geq 90$</td><td>$\eta_{wh} \geq 163$</td><td>$\eta_{wh} \geq 188$</td><td>$\eta_{wh} \geq 200$</td><td>$\eta_{wh} \geq 213$</td></tr>
<tr><td>A^{++}</td><td>$53 \leq \eta_{wh} < 62$</td><td>$53 \leq \eta_{wh} < 62$</td><td>$61 \leq \eta_{wh} < 69$</td><td>$72 \leq \eta_{wh} < 90$</td><td>$130 \leq \eta_{wh} < 163$</td><td>$150 \leq \eta_{wh} < 188$</td><td>$160 \leq \eta_{wh} < 200$</td><td>$170 \leq \eta_{wh} < 213$</td></tr>
<tr><td>A^{+}</td><td>$44 \leq \eta_{wh} < 53$</td><td>$44 \leq \eta_{wh} < 53$</td><td>$53 \leq \eta_{wh} < 61$</td><td>$55 \leq \eta_{wh} < 72$</td><td>$100 \leq \eta_{wh} < 130$</td><td>$115 \leq \eta_{wh} < 150$</td><td>$123 \leq \eta_{wh} < 160$</td><td>$131 \leq \eta_{wh} < 170$</td></tr>
<tr><td>A</td><td>$35 \leq \eta_{wh} < 44$</td><td>$35 \leq \eta_{wh} < 44$</td><td>$38 \leq \eta_{wh} < 53$</td><td>$38 \leq \eta_{wh} < 55$</td><td>$65 \leq \eta_{wh} < 100$</td><td>$75 \leq \eta_{wh} < 115$</td><td>$80 \leq \eta_{wh} < 123$</td><td>$85 \leq \eta_{wh} < 131$</td></tr>
<tr><td>B</td><td>$32 \leq \eta_{wh} < 35$</td><td>$32 \leq \eta_{wh} < 35$</td><td>$35 \leq \eta_{wh} < 38$</td><td>$35 \leq \eta_{wh} < 38$</td><td>$39 \leq \eta_{wh} < 65$</td><td>$50 \leq \eta_{wh} < 75$</td><td>$55 \leq \eta_{wh} < 80$</td><td>$60 \leq \eta_{wh} < 85$</td></tr>
<tr><td>C</td><td>$29 \leq \eta_{wh} < 32$</td><td>$29 \leq \eta_{wh} < 32$</td><td>$32 \leq \eta_{wh} < 35$</td><td>$32 \leq \eta_{wh} < 35$</td><td>$36 \leq \eta_{wh} < 39$</td><td>$37 \leq \eta_{wh} < 50$</td><td>$38 \leq \eta_{wh} < 55$</td><td>$40 \leq \eta_{wh} < 60$</td></tr>
<tr><td>D</td><td>$26 \leq \eta_{wh} < 29$</td><td>$26 \leq \eta_{wh} < 29$</td><td>$29 \leq \eta_{wh} < 32$</td><td>$29 \leq \eta_{wh} < 32$</td><td>$33 \leq \eta_{wh} < 36$</td><td>$34 \leq \eta_{wh} < 37$</td><td>$35 \leq \eta_{wh} < 38$</td><td>$36 \leq \eta_{wh} < 40$</td></tr>
<tr><td>E</td><td>$22 \leq \eta_{wh} < 26$</td><td>$23 \leq \eta_{wh} < 26$</td><td>$26 \leq \eta_{wh} < 29$</td><td>$26 \leq \eta_{wh} < 29$</td><td>$30 \leq \eta_{wh} < 33$</td><td>$30 \leq \eta_{wh} < 34$</td><td>$30 \leq \eta_{wh} < 35$</td><td>$32 \leq \eta_{wh} < 36$</td></tr>
<tr><td>F</td><td>$19 \leq \eta_{wh} < 22$</td><td>$20 \leq \eta_{wh} < 23$</td><td>$23 \leq \eta_{wh} < 26$</td><td>$23 \leq \eta_{wh} < 26$</td><td>$27 \leq \eta_{wh} < 30$</td><td>$27 \leq \eta_{wh} < 30$</td><td>$27 \leq \eta_{wh} < 30$</td><td>$28 \leq \eta_{wh} < 32$</td></tr>
<tr><td>G</td><td>$\eta_{wh} < 19$</td><td>$\eta_{wh} < 20$</td><td>$\eta_{wh} < 23$</td><td>$\eta_{wh} < 23$</td><td>$\eta_{wh} < 27$</td><td>$\eta_{wh} < 27$</td><td>$\eta_{wh} < 27$</td><td>$\eta_{wh} < 28$</td></tr>
</table></td><td></td><td>N/A</td></tr>
<tr><td>3</td><td>ENERGY EFFICIENCY CLASSES OF SOLAR HOT WATER STORAGE TANKS, IF (PART OF) A SOLAR DEVICE</td><td></td><td>N/A</td></tr>
<tr><td></td><td>The energy efficiency class of a solar hot water storage tank, if (part of) a solar device, shall be determined on the basis
of its standing loss as set out in Table 4.
Table 4
Energy efficiency classes of solar hot water storage tanks, if (part of) a solar device
<table>
<tr><th>Energy efficiency class</th><th>Standing loss S in Watts, with storage volume V in litres</th></tr>
<tr><td>A+</td><td>$S < 5{,}5 + 3{,}16 \cdot V^{0,4}$</td></tr>
<tr><td>A</td><td>$5{,}5 + 3{,}16 \cdot V^{0,4} \leq S < 8{,}5 + 4{,}25 \cdot V^{0,4}$</td></tr>
<tr><td>B</td><td>$8{,}5 + 4{,}25 \cdot V^{0,4} \leq S < 12 + 5{,}93 \cdot V^{0,4}$</td></tr>
<tr><td>C</td><td>$12 + 5{,}93 \cdot V^{0,4} \leq S < 16{,}66 + 8{,}33 \cdot V^{0,4}$</td></tr>
<tr><td>D</td><td>$16{,}66 + 8{,}33 \cdot V^{0,4} \leq S < 21 + 10{,}33 \cdot V^{0,4}$</td></tr>
<tr><td>E</td><td>$21 + 10{,}33 \cdot V^{0,4} \leq S < 26 + 13{,}66 \cdot V^{0,4}$</td></tr>
<tr><td>F</td><td>$26 + 13{,}66 \cdot V^{0,4} \leq S < 31 + 16{,}66 \cdot V^{0,4}$</td></tr>
<tr><td>G</td><td>$S > 31 + 16{,}66 \cdot V^{0,4}$</td></tr>
</table></td><td></td><td>N/A</td></tr>
</table>

Table for heating test data - Low temperature application (Average)

Test	-	A	B	C	D	E	F
General test conditions/part load	unit	A-7/W34 (88%)	A2/W30 (54%)	A7/W27 (35%)	A12/W24 (15%)	A-10/W35 (100%)	A-7/W34 (88%)
Barometric	KPa	101.30	101.30	101.30	101.30	101.30	101.30
Voltage	V	230.0	230.0	230.0	230.0	230.0	230.0
Current input	A	9.461	4.278	2.411	1.492	12.240	9.461
Power input	kW	2.176	0.984	0.554	0.343	2.816	2.176
Test conditions indoor unit							
Inlet water temperature	℃	28.8	26.8	24.3	21.3	29.3	28.8
Outlet water temperature	℃	34.0	30.1	27.0	23.7	35.0	34.0
Water flow	M^3/h	1.2	1.2	1.2	1.2	1.2	1.2
Test conditions outdoor unit							
Air inlet temperature, DB	℃	-7.00	1.03	7.00	12.01	-10.00	-7.00
Air outlet temperature, WD	℃	-7.79	0.99	6.02	11.01	-10.95	-7.79
Heating capacity	kW	7.290	4.585	3.723	3.313	7.940	7.290
Co-efficiency of performance	-	3.31	4.52	6.56	9.72	2.79	3.31
Compressor frequency	Hz	68	34	25	22	82	68

SCOP calculation (**Average**):

	Outdoor air °C	Indoor outlet water temper °C	Part Load Ratio, %	Part Load kW	Measured heating capacity kW	Measured input Power kW	Measured COP	Cd	CR	COP_{PL} (COP bin (Tj))
A	-7	34	88	6.987	7.290	2.176	3.35	0.90	1.00	3.35
B	2	30	54	4.288	4.585	0.984	4.56	0.90	1.00	4.56
C	7	27	35	2.780	3.723	0.554	6.72	0.90	0.80	6.72
D	12	24	15	1.191	3.313	0.343	9.65	0.90	0.38	9.65
E	-10	35	100	8.000	7.94	2.816	2.82	0.90	1.00	2.82
F	-7	34	88	6.787	7.290	2.176	3.35	0.90	1.00	3.35

	Power W	Hours	P × H
Thermostat Off	48.7	178	8.67
Standby	9.0	0	0.00
CK	35.0	3850	134.75
Off	9.0	3672	33.05

items	value	unit
Pdesignh	8.000	kW
Hhe	2066	h
Qh	16528	kWh
Qhe	3617	kWh
SCOP	4.569	-
CC	2.5	-
η	181%	-
Energy efficiency class	A+++	-

Table 2

Seasonal space heating energy efficiency class of low-temperature heat pumps and heat pump space heaters for low-temperature application

Seasonal space heating energy efficiency class	Seasonal space heating energy efficiency η_s in %
A^{+++}	$\eta_s \geq 175$
A^{++}	$150 \leq \eta_s < 175$
A^{+}	$123 \leq \eta_s < 150$
A	$115 \leq \eta_s < 123$
B	$107 \leq \eta_s < 115$
C	$100 \leq \eta_s < 107$
D	$61 \leq \eta_s < 100$
E	$59 \leq \eta_s < 61$
F	$55 \leq \eta_s < 59$
G	$\eta_s < 55$

Table for heating test data - Medium temperature application (Average)

Test	-	A	B	C	D	E	F
General test conditions/part load	unit	A-7/W52 (88%)	A2/W42 (54%)	A7/W36 (35%)	A12/W30 (15%)	A-10/W55 (100%)	A-7/W52 (88%)
Barometric	KPa	101.30	101.30	101.30	101.30	101.30	101.30
Voltage	V	230.0	230.0	230.0	230.0	230.0	230.0
Current input	A	10.53	4.89	2.64	1.63	14.03	10.53
Power input	kW	2.424	1.124	0.607	0.376	3.227	2.421
Test conditions indoor unit							
Inlet water temperature	℃	47.5	39.2	34.2	28.0	50.0	47.5
Outlet water temperature	℃	52.0	42.0	36.3	30.0	54.9	52.0
Water flow	M^3/h	1.2	1.2	1.2	1.2	1.2	1.2
Test conditions outdoor unit							
Air inlet temperature, DB	℃	-7.01	2.02	6.98	12.01	-10.30	-7.01
Air outlet temperature, WD	℃	-7.99	1.00	6.00	11.01	-11.00	-7.99
Heating capacity	kW	6.247	3.946	2.968	2.766	6.873	6.247
Co-efficiency of performance	-	2.58	3.51	4.89	7.35	2.13	2.58
Compressor frequency	Hz	64	34	25	22	76	64

SCOP calculation (Average):

	Outdoor air °C	Indoor outlet water temper °C	Part Load Ratio, %	Part Load kW	Measured heating capacity kW	Measured input Power kW	Measured COP	Cd	CR	COP_{PL} (COP bin (Tj))
A	-7	52	88	6.160	6.247	2.421	2.58	0.90	1.00	2.58
B	2	42	54	3.780	3.946	1.124	3.51	0.90	1.00	3.51
C	7	36	35	2.450	2.968	0.607	4.89	0.90	0.83	4.89
D	12	30	15	1.050	2.766	0.376	7.35	0.90	0.38	7.35
E	-10	55	100	7.000	6.873	3.227	2.13	0.90	1.00	2.13
F	-7	52	88	6.160	6.247	2.421	2.58	0.90	1.00	2.58

	Power W	Hours	P × H
Thermostat Off	48.7	178	8.67
Standby	9.0	0	0.00
CK	35.0	3850	134.75
Off	9.0	3672	33.05

items	value	unit
Pdesignh	7.000	kW
Hhe	2066	h
Qh	14462	kWh
Qhe	4229	kWh
SCOP	3.420	-
CC	2.5	-
η	133%	-
Energy efficiency class	A++	-

Table 1

Seasonal space heating energy efficiency classes of heaters, with the exception of low-temperature heat pumps and heat pump space heaters for low-temperature application

Seasonal space heating energy efficiency class	Seasonal space heating energy efficiency η_s in %
A^{+++}	$\eta_s \geq 150$
A^{++}	$125 \leq \eta_s < 150$
A^{+}	$98 \leq \eta_s < 125$
A	$90 \leq \eta_s < 98$
B	$82 \leq \eta_s < 90$
C	$75 \leq \eta_s < 82$
D	$36 \leq \eta_s < 75$
E	$34 \leq \eta_s < 36$
F	$30 \leq \eta_s < 34$
G	$\eta_s < 30$

Photos:

Overview

Compressor

End of report