Heat pump ERP Test Report

Report Number.....:	4394367.85
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-060IIC
Ratings ..... :	380 V 3N~, 50 Hz, R32/3100g, 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:

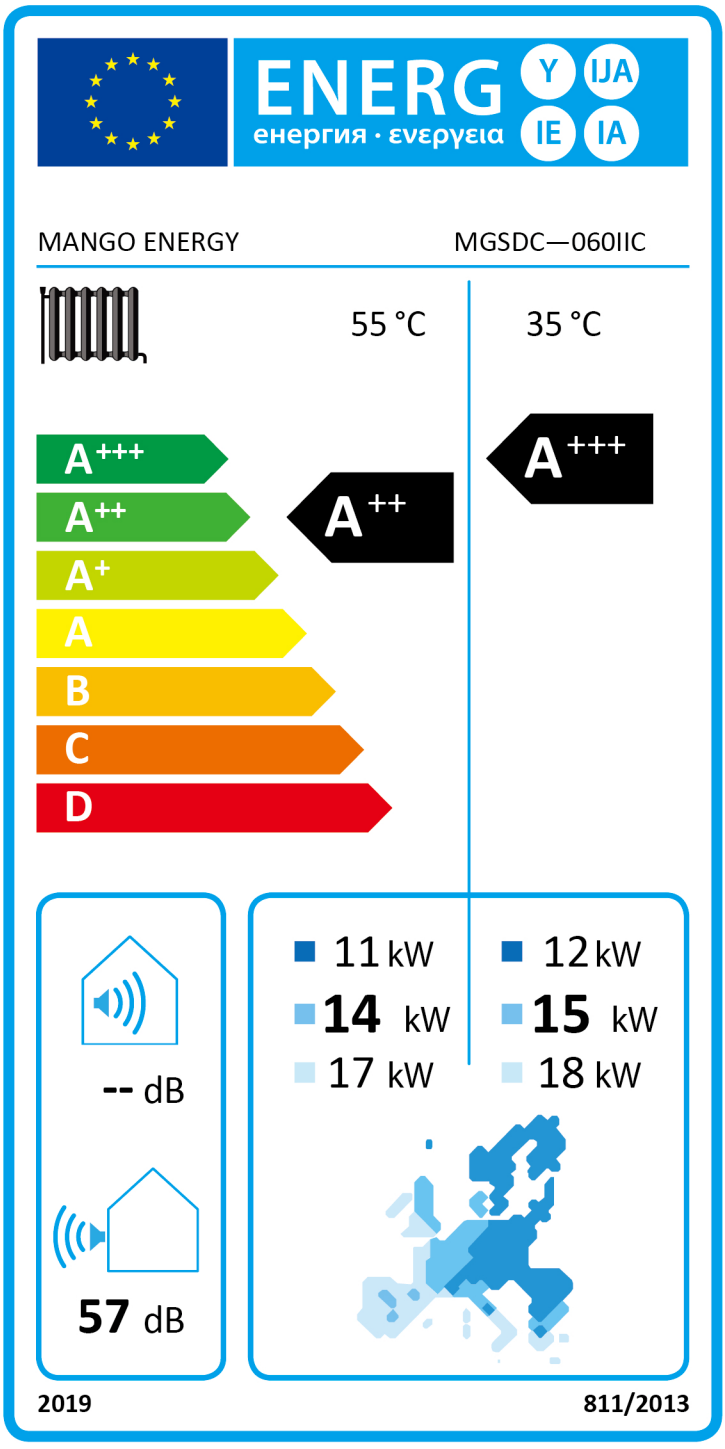
The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

Mango Energy

DC Inverter Air - Water Heat Pump

Model	MGSDC-060IIC
Power Supply	380V~50Hz/3Ph
Heating(air-10℃/water35℃)	
Heating Capacity	15.0kW
Rated Input Power	5.54kW
COP	2.71W/W
Hot water(air-10℃/water55℃)	
Heating Capacity	14.0kW
Rated Input Power	6.57kW
COP	2.13W/W
Cooling(air+35℃/water7℃)	
Cooling Capacity	13.0kW
Rated Input Power	4.59kW
EER	2.83W/W
Max.Input Power	6.5kW
Max.Current	9.85A
Max.Pressure	4. 2Mpa
Min.Pressure	2. 1Mpa
Refrigerant	R32/3100g
Water flow	≥2. 58m³/h
Water pressure drop	≦42kpa
Water pipe size	DN 25
Water Proof Class	IPX4
Noise	≦57.0dB(A)
Size(WxDxH)	1050x400x1350(mm)
Net Weight	120.0kg

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 ..... :	2022-08-28
Date (s) of performance of tests ..... :	2022-08-28 to 2022-09-03

General remarks:

The test results presented in this report relate only to the object tested.
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"(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.
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This report is not used for social proof function in China market.

General product information:	
Model number of Unit Under Test	MGSDC-060IIC
Power Supply	three-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-060IIC			
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	14	kW	Seasonal space heating energy efficiency	ηs	130	%
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	12.89	kW	Tj = – 7 °C	COPd	2.45	—
Tj = 2 °C	Pdh	7.83	kW	Tj = 2 °C	COPd	3.50	—
Tj = 7 °C	Pdh	5.96	kW	Tj = 7 °C	COPd	4.89	—
Tj = 12 °C	Pdh	5.27	kW	Tj = 12 °C	COPd	7.40	—
Tj = bivalent temperature	Pdh	14.01	kW	Tj = bivalent temperature	COPd	2.13	—
Tj = operating limit	Pdh	12.89	kW	Tj = operating limit	COPd	2.45	—
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	0.16	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}	0.350	kW				
Other items							
Capacity control	-	variable		For air-to-water heat pumps: Rated air flow rate, outdoors	-	2.58	m^3/h
Sound power level, indoors/ outdoors	L_{WA}	-/57	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>

Clause	Energy efficiency classes	Result - Remark	Verdict
	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.		N/A
	The water heating energy efficiency of a combination heater shall be calculated in accordance with point 5 of Annex VII.		N/A
	Table 3 Water heating energy efficiency classes of combination heaters, categorised by declared load profiles, η_{wh} in %		N/A

	XXS	XXS	XS	S	M	L	XL	XXL
A+++	$\eta_{wh} \geq 62$	$\eta_{wh} \geq 62$	$\eta_{wh} \geq 69$	$\eta_{wh} \geq 90$	$\eta_{wh} \geq 163$	$\eta_{wh} \geq 188$	$\eta_{wh} \geq 209$	$\eta_{wh} \geq 213$
A++	$53 \leq \eta_{wh} < 62$	$53 \leq \eta_{wh} < 62$	$61 \leq \eta_{wh} < 69$	$72 \leq \eta_{wh} < 90$	$130 \leq \eta_{wh} < 163$	$150 \leq \eta_{wh} < 188$	$160 \leq \eta_{wh} < 209$	$170 \leq \eta_{wh} < 213$
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	$33 \leq \eta_{wh} < 44$	$35 \leq \eta_{wh} < 44$	$38 \leq \eta_{wh} < 53$	$38 \leq \eta_{wh} < 55$	$65 \leq \eta_{wh} < 100$	$75 \leq \eta_{wh} < 115$	$80 \leq \eta_{wh} < 123$	$85 \leq \eta_{wh} < 131$
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	$\eta_{wh} < 19$	$\eta_{wh} < 20$	$\eta_{wh} < 23$	$\eta_{wh} < 23$	$\eta_{wh} < 27$	$\eta_{wh} < 27$	$\eta_{wh} < 27$	$\eta_{wh} < 28$

3	ENERGY EFFICIENCY CLASSES OF SOLAR HOT WATER STORAGE TANKS, IF (PART OF) A SOLAR DEVICE		N/A
	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**		N/A

Energy efficiency class	Standing loss S in Watts, with storage volume V in litres
A+	$S < 5,5 + 3,16 \cdot V^{0,4}$
A	$5,5 + 3,16 \cdot V^{0,4} \leq S < 8,5 + 4,25 \cdot V^{0,4}$
B	$8,5 + 4,25 \cdot V^{0,4} \leq S < 12 + 5,93 \cdot V^{0,4}$
C	$12 + 5,93 \cdot V^{0,4} \leq S < 16,66 + 8,33 \cdot V^{0,4}$
D	$16,66 + 8,33 \cdot V^{0,4} \leq S < 21 + 10,33 \cdot V^{0,4}$
E	$21 + 10,33 \cdot V^{0,4} \leq S < 26 + 13,66 \cdot V^{0,4}$
F	$26 + 13,66 \cdot V^{0,4} \leq S < 31 + 16,66 \cdot V^{0,4}$
G	$S > 31 + 16,66 \cdot V^{0,4}$

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	400.0	400.0	400.0	400.0	400.0	400.0
Current input	A	5.74	2.31	1.66	1.03	6.59	5.74
Power input	kW	3.980	1.603	1.149	0.716	4.567	3.980
Test conditions indoor unit							
Inlet water temperature	℃	29.6	27.6	24.6	21.6	30.9	29.6
Outlet water temperature	℃	34.0	30.0	27.0	23.9	35.0	34.0
Water flow	M^3/h	2.58	2.58	2.58	2.58	2.58	2.58
Test conditions outdoor unit							
Air inlet temperature, DB	℃	-7.00	1.01	7.00	12.00	-10.00	-7.00
Air outlet temperature, WD	℃	-7.98	0.98	6.05	10.59	-11.10	-7.98
Heating capacity	kW	13.251	7.037	7.332	6.887	12.377	13.251
Co-efficiency of performance	-	3.32	4.55	6.68	9.31	2.81	3.32
Compressor frequency	Hz	72	36	25	22	84	72

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	13.215	13.215	3.980	3.32	0.90	1.00	3.32
B	2	30	54	8.044	7.037	1.603	4.39	0.90	1.14	4.39
C	7	27	35	5.171	7.332	1.149	6.38	0.90	0.71	6.38
D	12	24	15	2.298	6.887	0.716	9.62	0.90	0.33	9.62
E	-10	35	100	14.939	12.377	4.567	2.71	0.90	1.21	2.71
F	-7	34	88	13.215	13.215	3.980	3.32	0.90	0.96	3.32

	Power W	Hours	P × H
Thermostat Off	48.7	178	8.67
Standby	9.0	0	0.00
CK	35	3850	134.75
Off	9.0	3672	33.05

items	value	unit
Pdesignh	14.939	kW
Hhe	2066	h
Qh	30863	kWh
Qhe	7041	kWh
SCOP	4.610	-
CC	2.5	-
η	179%	-
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	400.0	400.0	400.0	400.0	400.0	400.0
Current input	A	7.59	3.25	1.76	1.03	9.50	7.59
Power input	kW	5.262	2.254	1.218	0.713	6.580	5.262
Test conditions indoor unit							
Inlet water temperature	℃	46.6	38.9	34.0	27.7	49.0	46.6
Outlet water temperature	℃	52.0	42.0	36.3	29.8	55.0	52.0
Water flow	M^3/h	2.58	2.58	2.58	2.58	2.58	2.58
Test conditions outdoor unit							
Air inlet temperature, DB	℃	-7.00	2.07	6.99	12.01	-10.10	-7.00
Air outlet temperature, WD	℃	-7.99	0.98	6.01	10.87	-11.02	-7.99
Heating capacity	kW	12.893	7.819	5.958	5.273	14.010	12.893
Co-efficiency of performance	-	2.45	3.50	4.89	7.40	2.13	2.45
Compressor frequency	Hz	72	36	25	22	84	72

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	12.329	12.893	5.262	2.45	0.90	1.00	2.45
B	2	42	54	7.565	7.819	2.254	3.50	0.90	0.97	3.50
C	7	36	35	4.904	5.985	1.218	4.89	0.90	0.82	4.89
D	12	30	15	2.102	5.273	0.713	7.40	0.90	0.40	7.40
E	-10	55	100	14.000	14.010	6.580	2.13	0.90	1.00	2.13
F	-7	52	88	12.329	12.893	5.262	2.45	0.90	1.00	2.45

	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	14.010	kW
Hhe	2066	h
Qh	28945	kWh
Qhe	8645	kWh
SCOP	3.348	-
CC	2.5	-
η	130%	-
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	$\eta_s < 30$

EN 14825 heat pump air to water

Photos:

Overview

Compressor

End of report