REPORT

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Testing of dehumidifiers

(1 appendix)

Note:

This is an additional report to the original report 6P05187, dated: 2016-08-29. This is a translation from the Swedish original document. In case of a dispute, the original is valid.

Assignment

SP has tested six dehumidifiers to assess their dehumidification capacity, dehumidification efficiency, electrical power/energy use and ease of use, on behalf of Förlaget Villaliv AB, as described in this report. The sound power level was also measured in accordance with ISO3741 and the results are presented in a separate report, 6P05187-01.

Test location and date

Testing was carried out in the department of Energy and bioeconomy at SP Technical Research Institute of Sweden, between July and August 2016.

Test object

Table 1. Test objects

	Model	Arrival date at SP
1	Woods ED-50	15/06/2016
2	Woods MRD-20	22/06/2016
3	Mitsubishi Electric, MJ-E14CG	21/06/2016
4	Mill, TG10B	04/07/2016
5	Meaco, 20L Platinum	04/07/2016
6	Sandstrøm, SDH20L13E	22/06/2016

The test objects were supplied to SP Technical Research Institute of Sweden by the client and all arrived in undamaged condition.

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Test method

Performance testing – dehumidification

Testing was carried out at two test points: 18 and 23°C, at 70% relative humidity (RH). The performance of the test objects in each operating situation is presented in the form of:

- Dehumidification capacity, volume of water collected, litres/day
- Electrical power/energy use, W and kWh/day
- Dehumidification efficiency, volume of water collected in litres/kWh (DER – dehumidification efficiency ratio).

The test objects were tested simultaneously in a climate chamber with continuous control of the air temperature and RH to maintain a constant climate throughout the measurement period. This ensured that all the test objects were subjected to the same climate conditions. The test objects were positioned at a uniform distance from each other and were oriented so that the exhaust air from each dehumidifier did not affect the other units. The test objects were connected to a power supply monitored by SP's measurement equipment to determine the electrical power input. By agreement with the client the test objects were set to the power setting recommended in the manual for continuous dehumidification at each test point, or if no recommendation was given they were set to the highest fan speed and continuous dehumidification. The collected water was led by hose to external containers and the electrical power was recorded continuously. After completion of each test point the amount of collected water was weighed. The conversion from kilograms to litres was based on the density of water at 20°C: 998.2 kg/m^3. The test objects were run for between 22.5 and 23.2 hours at each test point.

Results

The test results only apply to the test objects provided and their settings under the specified conditions and with the associated equipment. All the test data that was measured and calculated during the measurement period is recorded in tables 2–7 as rounded mean values. The assessment of ease of use is presented in table 8 and is a subjective assessment.

Table 2. Results Woods ED-50

Set operating mode	High, setting II		
Test points		**1**	**2**
Incoming dry air temperature	°C	18	23
Incoming relative humidity	%	70	70
Measured parameters			
Temperature			
Incoming process air	°C	18.0	23.2
Relative humidity			
Incoming process air	%	70.5	70.2
Electrical power			
Electrical power, mean	W	474	541
Time			
Total measurement time	hours	23.1	22.5
Weight			
Condensed water	g	21878	25978
Calculated parameters			
Dehumidification capacity	l/day	22.7	27.7
Energy use	kWh/day	11.4	13.0
Dehumidification eff., DER	l/kWh	2.00	2.14

Table 3. Results Woods MRD-20

Set operating mode	High, dehumidify		
Test points		**1**	**2**
Incoming dry air temperature	°C	18	23
Incoming relative humidity	%	70	70
Measured parameters			
Temperature			
Incoming process air	°C	18.0	23.2
Relative humidity			
Incoming process air	%	70.5	70.2
Electrical power			
Electrical power, mean	W	282	305
Time			
Total measurement time	hours	23.2	22.5
Weight			
Condensed water	g	10203	13721
Calculated parameters			
Dehumidification capacity	l/day	10.6	14.6
Energy use	kWh/day	6.8	7.3
Dehumidification eff., DER	l/kWh	1.57	2.00

Table 4. Results Mitsubishi Electric, MJ-E14CG

Set operating mode	Low		
Test points		**1**	**2**
Incoming dry air temperature	°C	18	23
Incoming relative humidity	%	70	70
Measured parameters			
Temperature			
Incoming process air	°C	18.0	23.2
Relative humidity			
Incoming process air	%	70.5	70.2
Electrical power			
Electrical power, mean	W	206	219
Time			
Total measurement time	hours	23.1	22.5
Weight			
Condensed water	g	6411	8151
Calculated parameters			
Dehumidification capacity	l/day	6.7	8.7
Energy use	kWh/day	4.9	5.3
Dehumidification eff., DER	l/kWh	1.35	1.66

Table 5. Results Mill, TG10B

Set operating mode	Default setting		
Test points		**1**	**2**
Incoming dry air temperature	°C	18	23
Incoming relative humidity	%	70	70
Measured parameters			
Temperature			
Incoming process air	°C	18.0	23.2
Relative humidity			
Incoming process air	%	70.5	70.2
Electrical power			
Electrical power, mean	W	160	176
Time			
Total measurement time	hours	23.1	22.5
Weight			
Condensed water	g	4319	5408
Calculated parameters			
Dehumidification capacity	l/day	4.5	5.8
Energy use	kWh/day	3.9	4.2
Dehumidification eff., DER	l/kWh	1.17	1.37

Table 6. Meaco, 20L Platinum

Set operating mode	High		
Test points		**1**	**2**
Incoming dry air temperature	°C	18	23
Incoming relative humidity	%	70	70
Measured parameters			
Temperature			
Incoming process air	°C	18.0	23.2
Relative humidity			
Incoming process air	%	70.5	70.2
Electrical power			
Electrical power, mean	W	234	261
Time			
Total measurement time	hours	23.1	22.5
Weight			
Condensed water	g	8808	11612
Calculated parameters			
Dehumidification capacity	l/day	9.2	12.4
Energy use	kWh/day	5.6	6.3
Dehumidification eff., DER	l/kWh	1.63	1.98

Table 7. Sandstrøm, SDH20L13E

Set operating mode	High		
Test points		**1**	**2**
Incoming dry air temperature	°C	18	23
Incoming relative humidity	%	70	70
Measured parameters			
Temperature			
Incoming process air	°C	18.0	23.2
Relative humidity			
Incoming process air	%	70.5	70.2
Electrical power			
Electrical power, mean	W	235	257
Time			
Total measurement time	hours	23.1	22.5
Weight			
Condensed water	g	8594	11018
Calculated parameters			
Dehumidification capacity	l/day	8.9	11.8
Energy use	kWh/day	5.6	6.2
Dehumidification eff., DER	l/kWh	1.58	1.91

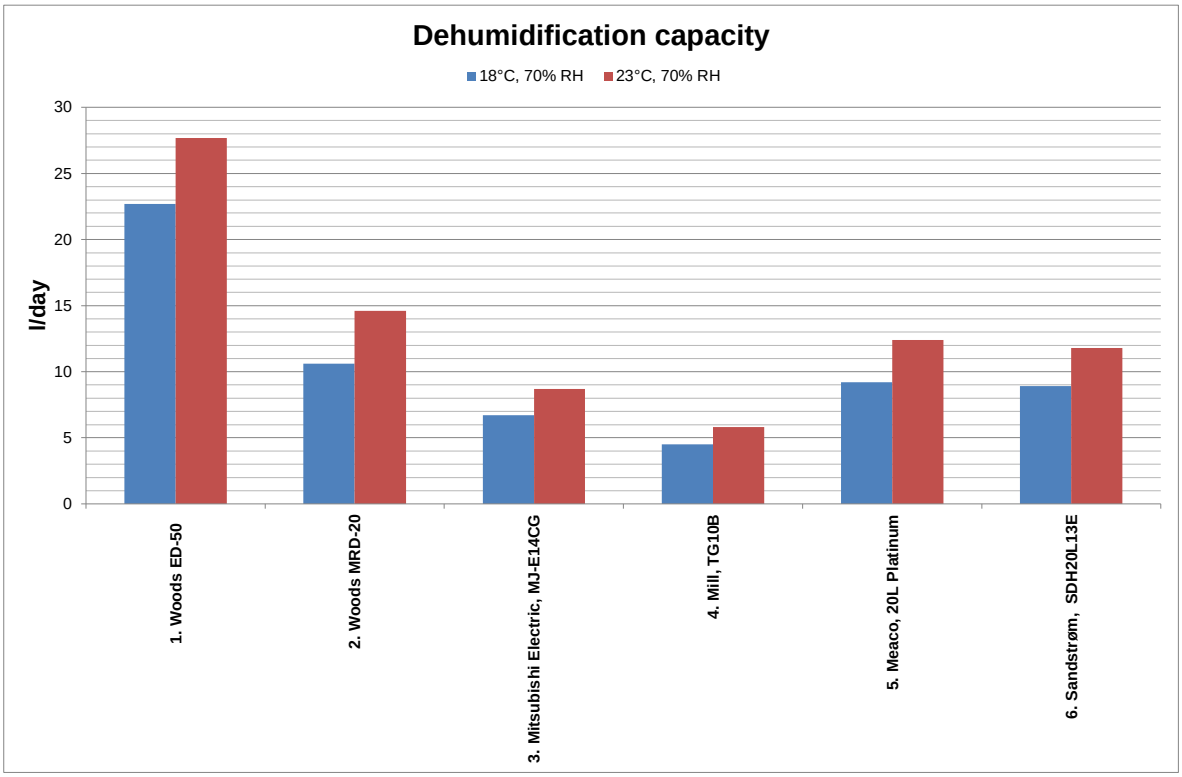

Figure 1. Diagram showing dehumidification capacity based on values in tables 2–7.

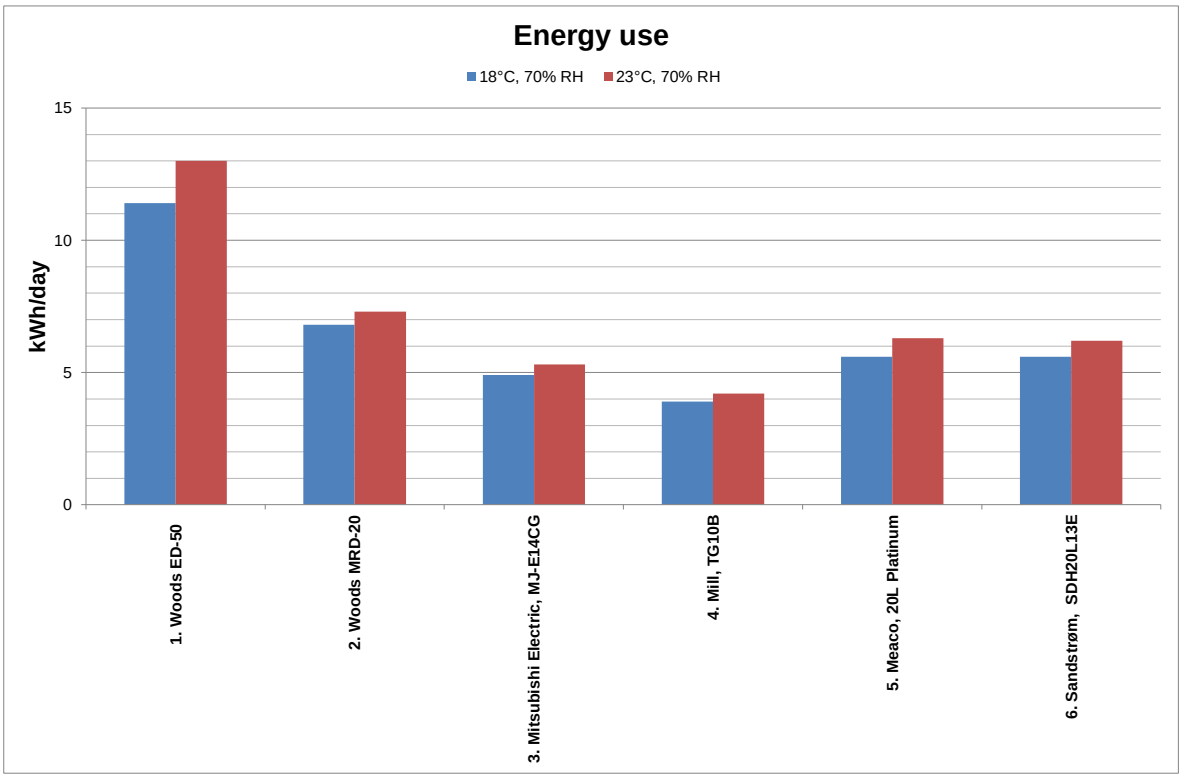

Figure 2. Diagram showing energy use based on values in tables 2–7.

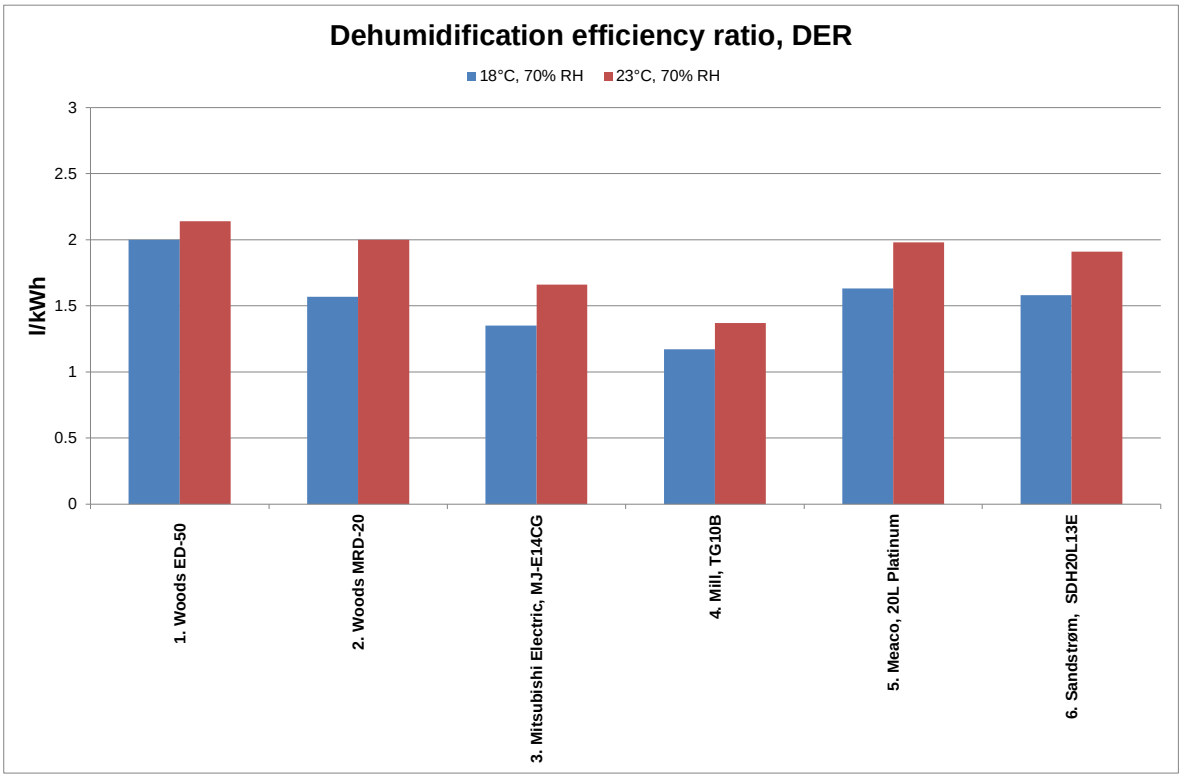

Figure 3. Diagram showing dehumidification efficiency based on values in tables 2–7.

Table 8. Assessment of ease of use, product data.

Model	**1 Woods ED-50**	**2 Woods MRD-20**	**3 Mitsubishi Electric MJ-E14CG**	**4 Mill TG10B**	**5 Meaco 20L Platinum**	**6 Sandstrøm SDH20L13E**
External dimensions (HxWxD)	527x343x480	593x356x240	570x384x187	475x325x248	595x385x290	572x390x273
Weight (kg)	21.7	13.4	11.4	9.4	13.8	12.4
Operating range (°C)	5–35	5–35	1–35	5–35	5–35	5–35
Manual	Swedish, necessary instructions provided	Swedish, necessary instructions provided	Swedish, necessary instructions provided	Not in Swedish, necessary instructions provided in English	Quick start guide in Swedish, full manual in English, necessary instructions provided	Swedish, necessary instructions provided
Condensed water tank, volume	10.4 l, easy to empty and refit	4.2 l, easy to empty and refit	3.8 l, easy to empty and refit	2.5 l, easy to empty and refit	6 l, easy to empty and refit	3.7 l, easy to empty and refit
Hose connection	Hose not supplied, easy to connect hose with Gardena coupling, can be positioned directly above drain without hose	Hose not supplied, easy to connect hose	Hose not supplied, easy to connect hose	Hose not supplied, easy to connect hose	Hose not supplied, easy to connect hose	Hose not supplied, easy to connect hose
Filter, recommended cleaning frequency	Clean or replace as needed or once a year, easy to install and replace	Clean as needed, easy to install and replace	Clean every alternate week, easy to install and replace	Clean once a month or as needed	Clean every alternate week, easy to install and replace	Clean every alternate week, easy to install and replace
Adjustable humidity level	Yes	Yes	Yes	Yes	Yes	Yes
Timer function	No	Yes	Yes	Yes	Yes	Yes
Other	Wheels, easy to move, quite heavy to lift	Wheels, easy to move	No wheels, easy to move, easy-grip handle	No wheels, easy to move, easy-grip handle	Wheels, easy to move, easy-grip handle	Wheels, easy to move, easy-grip handle

Equipment

Measurement train climate chamber (incl. PT-100)	SP Inv. no.	202391
Electrical power cabinet	SP Inv. no.	200711
Electrical power cabinet	SP Inv. no.	200450
Electrical power cabinet	SP Inv. no.	202655
Humidity sensor, Testo	SP Inv. no.	900062-1
Scales, Sartorius	SP Inv. no.	201336
Barometer, Testo 511	SP Inv. no.	900078

Estimated measurement uncertainty

Temperature	± 0.5 °C
Relative humidity	± 3% RH
Weight	± 1 g
Electric power	± 1%
Dehumidification capacity	± 5%
DER	± 5%

Remarks

During testing the dehumidifiers were set for continuous dehumidification in a chamber that maintained constant relative humidity. All the tested dehumidifiers have a control that enables the desired humidity to be selected, and the dehumidifiers then work to maintain this value. This function was not tested or evaluated. If this function is used and if the humidity is below the set value the actual energy use would presumably be lower than recorded in this report. The accuracy with which the different dehumidifiers maintain a uniform humidity level and their deviation from the set value have therefore not been investigated either.

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Performed by

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Examined by

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Appendix

1. Photos of test objects

Appendix 1

Photo 1. Woods, ED-50

Photo 2. Woods, MRD-20

Photo 3. Mitsubishi Electric, MJ-E14CG

Photo 4. Mill, TG10B

Photo 5. Meaco, 20L Platinum

Photo 6. Sandstrøm, SDH20L13E