



Australian Government

WATER
RATING

WELS labelling of the dryer component of washer-dryers

2008

The Water Efficiency Labelling and Standards (WELS) scheme is an Australian Government initiative in partnership with state and territory governments.



© Commonwealth of Australia 2017

Prepared by Aleksander Szann, Access Product Information Consultants, for the Department of the Environment, Water, Heritage and the Arts in 2008.

Ownership of intellectual property rights

Unless otherwise noted, copyright (and any other intellectual property rights, if any) in this publication is owned by the Commonwealth of Australia (referred to as the Commonwealth).

Creative Commons licence

All material in this publication is licensed under a Creative [Commons Attribution 4.0 International Licence](#) except content supplied by third parties, logos and the Commonwealth Coat of Arms.

Inquiries about the licence and any use of this document should be emailed to copyright@agriculture.gov.au.



Cataloguing data

This publication (and any material sourced from it) should be attributed as: Water Efficiency Labelling and Standards Regulator 2008, *WELS labelling of the dryer component of washer-dryers*, Department of the Environment, Water, Heritage and the Arts, Canberra. CC BY 4.0.

This publication is available at waterrating.gov.au/about/review-evaluation/product-research.

Water Efficiency Labelling and Standards Regulator
Water Efficiency Labelling and Standards scheme
Department of Agriculture and Water Resources
Postal address GPO Box 858 Canberra ACT 2601
Telephone 1800 372 746 (local calls) +61 2 6272 5232 (international)
Email wels@agriculture.gov.au
Web agriculture.gov.au

The Australian Government acting through the Department of Agriculture and Water Resources has exercised due care and skill in preparing and compiling the information and data in this publication. Notwithstanding, the Department of Agriculture and Water Resources, its employees and advisers disclaim all liability, including liability for negligence and for any loss, damage, injury, expense or cost incurred by any person as a result of accessing, using or relying on any of the information or data in this publication to the maximum extent permitted by law.

Contents

Executive summary 1
Introduction..... 2
Mode of operation of dryer 3
Labelling 4
Data..... 5
Proposed algorithms 7

Tables

Table 1 – Summary of option criteria..... 5
Table 2 – Comparative data 8
Table 3 — Dryer star rating – (Option 1)..... 11
Table 4 — Dryer star rating – (Option 2)..... 13
Table 5 — Dryer star rating – (Option 3)..... 15
Table 6 — Dryer star rating – (Option 4)..... 17
Table 7 — Dryer star rating – (Option 5)..... 19
Table 8 — Dryer star rating – (Option 6)..... 21

Figures

Figure 1 – Dryer mode of combination washer-dryer..... 2
Figure 2 — Linear regression graph 10
Figure 3 – Option 1 12
Figure 4 – Option 2 14
Figure 5 – Option 3..... 16
Figure 6 – Option 4..... 18
Figure 7 – Option 5 20
Figure 8 – Option 6..... 22

Executive summary

Combination washer-dryers are popular because:

- they are able to wash and dry clothes in a single machine
- they are compact and can be more easily located in spaces smaller than those required by separate washer and dryer units.

As the washer component of these products is already required to be labelled under the Water Efficiency Labelling and Standards (WELS) Scheme, and these products use significant volumes of water, evidence exists to support labelling of the dryer mode of these products. There is also the possibility that stand alone dryers which utilise the same drying principle as the washer-dryers of this study will be released onto the market and the labelling proposed in this report would also apply to such products.

Labelling of the dryer would inform consumers:

- 1) that the dryer uses water for the drying process
- 2) that the rated capacity (kg of clothes) of the dryer is less than the rated capacity of the washer
- 3) that the volume of water used for drying a load of clothes can be greater than that used for washing a larger load of clothes
- 4) about the dryer's water efficiency for comparison with other similar products.

Labelling would also encourage manufacturers to improve the water efficiency of their products as most of these machines consume more water (per unit of capacity) in drying mode than in washing mode.

Out of a number of options considered in this study for possible rating algorithms, the preferred algorithm is the one that:

- more clearly distinguishes between the quantity of water consumed (per unit of capacity) by the products and their respective assigned water ratings
- has a reasonable similarity with the corresponding energy rating.

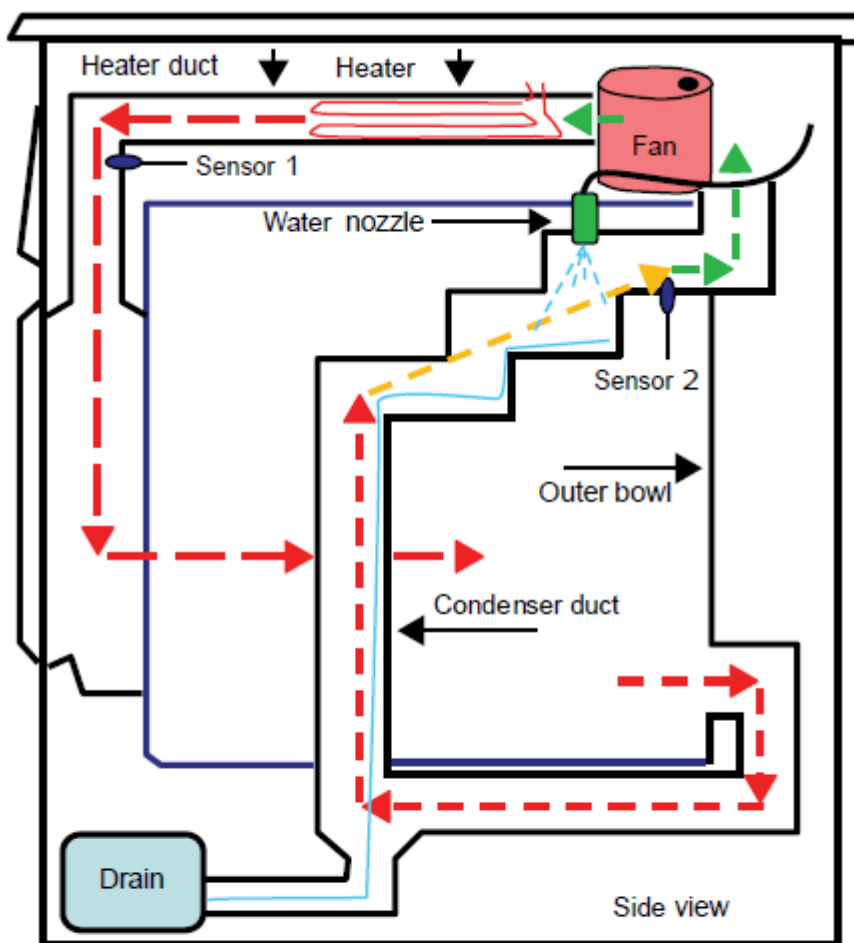
The minimum water rating bands for dryers have been set to commence at 1-star to correspond with the minimum rating for washing machines. It is noted that some of the products in this study consumed excessive quantities of water in their drying mode and as such their rating would be less than 1-star.

It is therefore suggested that the manufacturers and/or distributors modify these products in order to improve their water efficiency. Otherwise, consideration should be given to excluding these products from supply (in a manner akin to current minimum standards for toilets).

Introduction

Although combination washer-dryers only form a small proportion of the washing machine and dryer market, these products are popular because they combine the operations of washing and drying in a single machine. Also, because these products are a single unit they can be more easily located in a smaller space than separate washer and dryer units. As such, these products are popular in high rise apartments which generally have limited laundry space. A further advantage these products have over conventional dryers is that in their dryer mode they internally condense all moisture extracted from the washed clothes, and do not blow it out into the surrounding space. As such, these products can be located anywhere plumbing and power are available, without concern that they would add humidity to the surrounding area.

Figure 1 – Dryer mode of combination washer-dryer



- — — — — Dry hot air
- . - . - . Heated moist air
- - - - - Warm dry air
- - - - - Cool dry air

Mode of operation of dryer

The clothes drying process of a combination washer-dryer can be broadly represented by the schematic diagram of Figure 1 on the previous page.

In the drying process, a fan blows cool air over a dryer heater which heats the air. The hot air passes via a duct through to the drum containing the washed and spun-dry clothes.

The dry hot air then passes through the moist clothes, causing some of the moisture to evaporate. The moist vapour and the air that has cooled as a result of extracting the moist vapour from the washing, then passes through the perforations in the drum and onto an exit duct at the rear of the drum.

The moist vapour and the cooled air travel up a condenser duct and through a spray of cold water which cools and condenses the moist vapour. Any lint that enters the condenser duct with the vapour and cooled air is also washed away by the water spray.

The condensed vapour, spray water, and any lint, drains to a drain pump which empties the contents to waste.

The cooled air that flows past the water spray passes through the fan again and the whole process is continually repeated until sensors 1 and 2 detect that moisture from the washed clothes has been adequately removed.

In conventional dryers, air is heated and circulated through washed clothes. The heated air extracts moist vapour from the wet clothes, and together with any lint, is then blown out of the dryer and into the surrounding space. The dryer of a combination washer-dryer operates as a closed-loop energy system, as all the energy from the heated air is recycled back through the washing rather than blown out of the machine. However, as the water from the spray and the condensate are pumped to waste, these machines are design-challenged to be water efficient.

Labelling

As WELS already requires that the washing component of this product be registered, and since the drying mode of this product uses water to dry the washing, it is recommended that the dryer component should also be WELS labelled.

Labelling the dryer of these products would inform consumers that these products use water during the drying process, and that they also use significant quantities of water. Such information should encourage manufacturers to improve the water efficiencies of their products. As the water consumption of these machines in dryer mode, per unit of dryer capacity, varies from 4.56 L/Kg to 20.80 L/Kg, there appears to be sufficient potential for improving water efficiency.

The need to improve the water efficiency of these products is further highlighted by the fact that for most of these machines, the water consumed (per unit of capacity) in the drying mode is greater than that in the washing mode. It should also be noted that although the physical size of the drum in the machine is fixed, the rated capacity of the machine in drying mode is only about half that of the rated capacity in washer mode.

As such, the user of the machine has to either remove about half the full wash load and then dry the removed washing at a later time, or only use half the washer load so that the machine can wash and dry the clothes without the need for the user to handle wet washing. In the latter scenario, the washer would be used about twice as often as that for which the washer was WELS rated. In this case, it is likely the user will use significantly more water over their weekly washing, unless the machines load-sense or users manually reduce water levels to match their loads.

Data

Table 1 sets out comparative data for all the washer-dryers registered under energy rating and WELS schemes. Not all data for all products appear in the table, as some products registered for energy are not available in Australia, and are therefore not registered for WELS.

Tables 3 to 8 indicate the star ratings for Options 1 to 6 respectively that would be achieved by a dryer having a specified rated capacity and a water consumption as determined by the procedure in AS/NZS 2442.1 *Performance of household appliances — Rotary Clothes Dryers*.

For the purposes of maintaining uniformity with a similar table for washing machines in

AS/NZS 6400 *Water efficient products — Rating and labelling*, Tables 3 to 8 indicate star ratings ranging from 1 to 6 stars in half-star steps, and rated capacities ranging from 1.0 to 10.0 kg load capacities in 0.5 kg steps.

The formula used to calculate the parameters in Options 1 to 6 is given below.

$$\text{Star Rating Index} = 1 + \frac{\log_e \left(\frac{WC}{BWC} \right)}{\log_e (1 - \text{WRF})}$$

BWC = base water consumption = Litres x C

C = rated load capacity of the dryer (kg)

WC = water consumption of the model in litres

WRF = water reduction factor per additional star

The Base Water Consumption (BWC) and the Water Reduction Factor (WRF) used in the calculations of Options 1 to 6 are summarised in Table 2 below.

Table 1 – Summary of option criteria

Option	BWC (Base Water Consumption) litres/kg	WRF (Water Reduction Factor) % reduction in water per additional star
1	15.0	25.0 %
2	15.0	30.0 %
3	16.0	30.0 %
4	17.0	30.0 %
5	18.0	15.0 %
6	18.0	30.0 %

Figure 2 illustrates the linear regression of the water consumption and the rated capacity of each of the registered products.

WELS labelling of the dryer component of washer-dryers

Figures 3 to 8 represent the star ratings for Options 1 to 6 respectively (as indicated in Tables 3 to 8 respectively) for each of the products in this study.

Proposed algorithms

The criteria for proposing a suitable water rating algorithm for dryers were that:

- there would be a sufficient range of water consumption values within each rating band, but not so broad as to allow a product to increase its star rating with minor improvements to its water consumption
- the ratings that would be assigned to current products would allow future improvement in product water efficiencies without the need to re-scale the algorithm within at least a 5-year period
- the ratings that would be assigned to current products would align with, but preferably not exceed, the corresponding energy rating
- most (if not all) of the current products should fall within a 1-6 water star rating band.

As with the algorithm in *AS/NZS 6400 Water efficient products — Rating and labelling* for washing machines, the minimum water rating for condenser dryers was set at 1-star. In this regard it was noted that three products in this study consistently fell below this minimum for each of the Options considered. The water consumption of these is considered excessive and if they cannot be modified to attain the 1-star minimum rating they should not be offered for sale.

Referring to the above mentioned criteria for suitable algorithms, Options 1 and 5 were eliminated as possibilities because some of the current products would already be rated at 5 and 6-stars. As such, these algorithms would not encourage any future water efficiency improvements. Although Options 2, 3, 4 and 6 are similar, Option 2 is recommended because the ratings using the parameters in this option most closely meet all the above mentioned criteria.

Table 2 – Comparative data

Item	Capacity Dryer (kg)	Water Consump Dryer (L)	Water Consump per dryer capacity Dryer (L/kg)	Capacity Washer (kg)	Water Consump Washer (L)	Water Consump per washer capacity Washer (L/kg)	Regist'd Energy Star rating Washer	Regist'd Energy Star rating Dryer	Regist'd WELS Star rating Washer	Water Star ratings Option 1 Base:15L WRF: 0.25	Water Star ratings Option 2 Base: 15L WRF:0.3	Water Star ratings Option 3 Base: 16L WRF:0.3	Water Star ratings Option 4 Base: 17L WRF:0.3	Water Star ratings Option 5 Base: 18L WRF:0.15	Water Star ratings Option 6 Base: 18L WRF:0.3
1	1.5	28	18.67	5	62.8	12.56	1	1	—	0	0	0	0	0	0
2	2	39	19.50	5	100	20.00	2.5	1	—	0	0	0	0	0	0
3	2.5	11.4	4.56	5.5	48.2	8.76	4	3.5	4	5 (dark blue)	4	4.5	4.5	6+ (dark blue)	4.5
4	2.5	52	20.80	5	53.4	10.68	4	1.5	3.5	0	0	0	0	0	0
5	3.5	25.4	7.26	7	68	9.71	4	2.5	4	3.5	3	3	3	6+ (dark blue)	3.5
6	3.5	31.5	9.00	6.5	63.7	9.80	3.5	2.5	4	2.5	2	2	2	5	2.5
7	3.5	31.5	9.00	6	68	11.33	3	2.5	—	2.5	2	2.5	2.5	5 (dark blue)	2.5
8	3.5	31.5	9.00	7	71.1	10.16	3	2.5	4	2.5	2	2.5	2.5	5 (dark blue)	2.5
9	4	39	9.75	8	74.5	9.31	4	2	4	2.5	2	2	2	4.5	2.5
10	4	39	9.75	8	74.5	9.31	4.5	2	4	2.5	2	2	2	4.5	2.5
11	4	41	10.25	8	67	8.38	4.5	2	4.5	2	2	2	2	4	2.5
12	4	41	10.25	8	67	8.38	4.5	2	4.5	2	2	2	2	4	2.5
13	4	41.36	10.34	7.5	76.71	10.23	4	3	4	2	2	2	2	4	2.5
14	4	46	11.50	8	59.6	7.45	4.5	2.5	—	1.5	1.5	1.5	2	3.5	2
15	4	58	14.50	7	48.9	6.99	4	2	—	1	1	1	1	2	1.5
16	4	58	14.50	7	71.5	10.21	4.5	2	4	1	1	1	1	2	1.5
17	4	58	14.50	7	71.5	10.21	4.5	2	4	1	1	1	1	2	1.5

Report - WELS labelling of the dryer component of washer-dryers

Item	Capacity Dryer (kg)	Water Consump Dryer (L)	Water Consump per dryer capacity Dryer (L/kg)	Capacity Washer (kg)	Water Consump Washer (L)	Water Consump per washer capacity Washer (L/kg)	Regist'd Energy Star rating Washer	Regist'd Energy Star rating Dryer	Regist'd WELS Star rating Washer	Water Star ratings Option 1 Base:15L WRF: 0.25	Water Star ratings Option 2 Base: 15L WRF:0.3	Water Star ratings Option 3 Base: 16L WRF:0.3	Water Star ratings Option 4 Base: 17L WRF:0.3	Water Star ratings Option 5 Base: 18L WRF:0.15	Water Star ratings Option 6 Base: 18L WRF:0.3
18	4	58	14.50	7	82.8	11.83	4	2	—	1	1	1	1	2	1.5
19	4	58	14.50	8	86	10.75	4	3	—	1	1	1	1	2	1.5
20	4	—	—	7	115	16.43	3.5	2.5	—	—	—	—	—	—	—
21	5	34.08	6.82	9	91.48	10.16	4	2.5	4	3.5	3	3	3	6+ (dark blue)	3.5
22	5	64	12.80	9	87	9.67	4.5	1.5	4	1.5	1	1.5	1.5	2.5	1.5
23	5	72	14.40	9	113	12.56	4	2	—	1	1	1	1	2	1.5
24	6	62	10.33	10	114.68	11.47	4	3.5	—	2	2	2	2	4	2.5
25	6	76	12.67	10	77.9	7.79	4.5	2	4.5	1.5	1	1.5	1.5	3	1.5

Dark blue shading indicates where an option would place models in the 5, 6 and beyond star bands.

Figure 2 — Linear regression graph

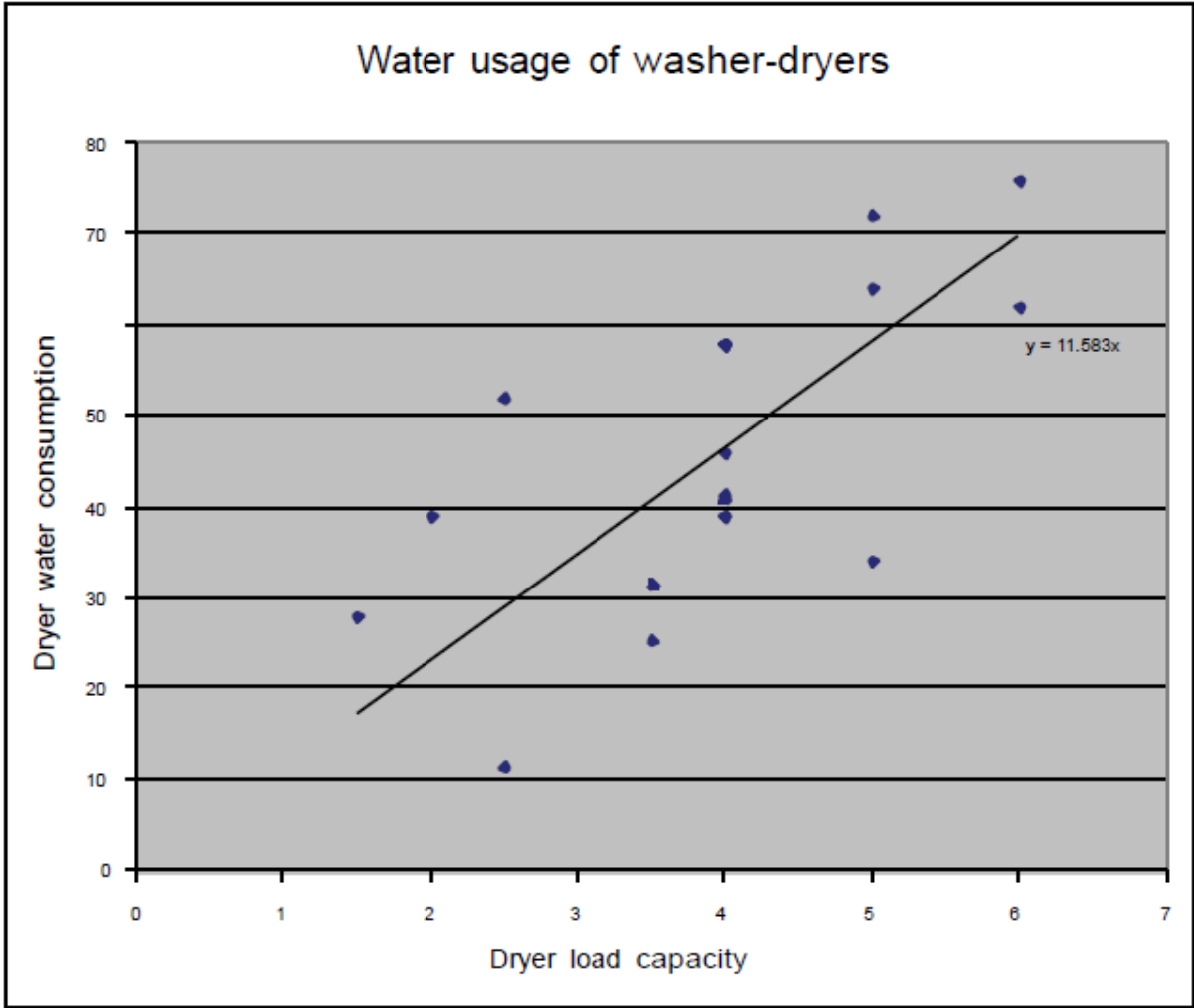


Table 3 — Dryer star rating – (Option 1)

BWC=15xCapacity

WRF=0.25 (25% reduction per star)

Dryer Load Capacity (kg)	1 Star	1.5 Stars	2 Stars	2.5 Stars	3 Stars	3.5 Stars	4 Stars	4.5 Stars	5 Stars	5.5 Stars	6 Stars
0	0	0	0	0	0	0	0	0	0	0	0
1.0	15.0	13.0	11.3	9.7	8.4	7.3	6.3	5.5	4.7	4.1	3.6
1.5	22.5	19.5	16.9	14.6	12.7	11.0	9.5	8.2	7.1	6.2	5.3
2.0	30.0	26.0	22.5	19.5	16.9	14.6	12.7	11.0	9.5	8.2	7.1
2.5	37.5	32.5	28.1	24.4	21.1	18.3	15.8	13.7	11.9	10.3	8.9
3.0	45.0	39.0	33.8	29.2	25.3	21.9	19.0	16.4	14.2	12.3	10.7
3.5	52.5	45.5	39.4	34.1	29.5	25.6	22.1	19.2	16.6	14.4	12.5
4.0	60.0	52.0	45.0	39.0	33.8	29.2	25.3	21.9	19.0	16.4	14.2
4.5	67.5	58.5	50.6	43.8	38.0	32.9	28.5	24.7	21.4	18.5	16.0
5.0	75.0	65.0	56.3	48.7	42.2	36.5	31.6	27.4	23.7	20.6	17.8
5.5	82.5	71.4	61.9	53.6	46.4	40.2	34.8	30.1	26.1	22.6	19.6
6.0	90.0	77.9	67.5	58.5	50.6	43.8	38.0	32.9	28.5	24.7	21.4
6.5	97.5	84.4	73.1	63.3	54.8	47.5	41.1	35.6	30.8	26.7	23.1
7.0	105.0	90.9	78.8	68.2	59.1	51.1	44.3	38.4	33.2	28.8	24.9
7.5	112.5	97.4	84.4	73.1	63.3	54.8	47.5	41.1	35.6	30.8	26.7
8.0	120.0	103.9	90.0	77.9	67.5	58.5	50.6	43.8	38.0	32.9	28.5
8.5	127.5	110.4	95.6	82.8	71.7	62.1	53.8	46.6	40.3	34.9	30.3
9.0	135.0	116.9	101.3	87.7	75.9	65.8	57.0	49.3	42.7	37.0	32.0
9.5	142.5	123.4	106.9	92.6	80.2	69.4	60.1	52.1	45.1	39.0	33.8
10.0	150.0	129.9	112.5	97.4	84.4	73.1	63.3	54.8	47.5	41.1	35.6

Figure 3 – Option 1



Table 4 — Dryer star rating – (Option 2)

BWC=15xCapacity

WRF=0.3 (30% reduction per star)

Dryer Load Capacity (kg)	1 Star	1.5 Stars	2 Stars	2.5 Stars	3 Stars	3.5 Stars	4 Stars	4.5 Stars	5 Stars	5.5 Stars	6 Stars
0	0	0	0	0	0	0	0	0	0	0	0
1.0	15.0	12.5	10.5	8.8	7.4	6.1	5.1	4.3	3.6	3.0	2.5
1.5	22.5	18.8	15.8	13.2	11.0	9.2	7.7	6.5	5.4	4.5	3.8
2.0	30.0	25.1	21.0	17.6	14.7	12.3	10.3	8.6	7.2	6.0	5.0
2.5	37.5	31.4	26.3	22.0	18.4	15.4	12.9	10.8	9.0	7.5	6.3
3.0	45.0	37.6	31.5	26.4	22.1	18.4	15.4	12.9	10.8	9.0	7.6
3.5	52.5	43.9	36.8	30.7	25.7	21.5	18.0	15.1	12.6	10.5	8.8
4.0	60.0	50.2	42.0	35.1	29.4	24.6	20.6	17.2	14.4	12.1	10.1
4.5	67.5	56.5	47.3	39.5	33.1	27.7	23.2	19.4	16.2	13.6	11.3
5.0	75.0	62.7	52.5	43.9	36.8	30.7	25.7	21.5	18.0	15.1	12.6
5.5	82.5	69.0	57.8	48.3	40.4	33.8	28.3	23.7	19.8	16.6	13.9
6.0	90.0	75.3	63.0	52.7	44.1	36.9	30.9	25.8	21.6	18.1	15.1
6.5	97.5	81.6	68.3	57.1	47.8	40.0	33.4	28.0	23.4	19.6	16.4
7.0	105.0	87.8	73.5	61.5	51.5	43.0	36.0	30.1	25.2	21.1	17.6
7.5	112.5	94.1	78.8	65.9	55.1	46.1	38.6	32.3	27.0	22.6	18.9
8.0	120.0	100.4	84.0	70.3	58.8	49.2	41.2	34.4	28.8	24.1	20.2
8.5	127.5	106.7	89.3	74.7	62.5	52.3	43.7	36.6	30.6	25.6	21.4
9.0	135.0	112.9	94.5	79.1	66.2	55.3	46.3	38.7	32.4	27.1	22.7
9.5	142.5	119.2	99.8	83.5	69.8	58.4	48.9	40.9	34.2	28.6	24.0
10.0	150.0	125.5	105.0	87.8	73.5	61.5	51.5	43.0	36.0	30.1	25.2

Figure 4 – Option 2



Table 5 — Dryer star rating – (Option 3)

BWC=16xCapacity

WRF=0.3 (30% reduction per star)

Dryer Load Capacity (kg)	1 Star	1.5 Stars	2 Stars	2.5 Stars	3 Stars	3.5 Stars	4 Stars	4.5 Stars	5 Stars	5.5 Stars	6 Stars
0	0	0	0	0	0	0	0	0	0	0	0
1.0	16.0	13.4	11.2	9.4	7.8	6.6	5.5	4.6	3.8	3.2	2.7
1.5	24.0	20.1	16.8	14.1	11.8	9.8	8.2	6.9	5.8	4.8	4.0
2.0	32.0	26.8	22.4	18.7	15.7	13.1	11.0	9.2	7.7	6.4	5.4
2.5	40.0	33.5	28.0	23.4	19.6	16.4	13.7	11.5	9.6	8.0	6.7
3.0	48.0	40.2	33.6	28.1	23.5	19.7	16.5	13.8	11.5	9.6	8.1
3.5	56.0	46.9	39.2	32.8	27.4	23.0	19.2	16.1	13.4	11.2	9.4
4.0	64.0	53.5	44.8	37.5	31.4	26.2	22.0	18.4	15.4	12.9	10.8
4.5	72.0	60.2	50.4	42.2	35.3	29.5	24.7	20.7	17.3	14.5	12.1
5.0	80.0	66.9	56.0	46.9	39.2	32.8	27.4	23.0	19.2	16.1	13.4
5.5	88.0	73.6	61.6	51.5	43.1	36.1	30.2	25.3	21.1	17.7	14.8
6.0	96.0	80.3	67.2	56.2	47.0	39.4	32.9	27.6	23.1	19.3	16.1
6.5	104.0	87.0	72.8	60.9	51.0	42.6	35.7	29.8	25.0	20.9	17.5
7.0	112.0	93.7	78.4	65.6	54.9	45.9	38.4	32.1	26.9	22.5	18.8
7.5	120.0	100.4	84.0	70.3	58.8	49.2	41.2	34.4	28.8	24.1	20.2
8.0	128.0	107.1	89.6	75.0	62.7	52.5	43.9	36.7	30.7	25.7	21.5
8.5	136.0	113.8	95.2	79.7	66.6	55.8	46.6	39.0	32.7	27.3	22.9
9.0	144.0	120.5	100.8	84.3	70.6	59.0	49.4	41.3	34.6	28.9	24.2
9.5	152.0	127.2	106.4	89.0	74.5	62.3	52.1	43.6	36.5	30.5	25.5
10.0	160.0	133.9	112.0	93.7	78.4	65.6	54.9	45.9	38.4	32.1	26.9

Figure 5 – Option 3

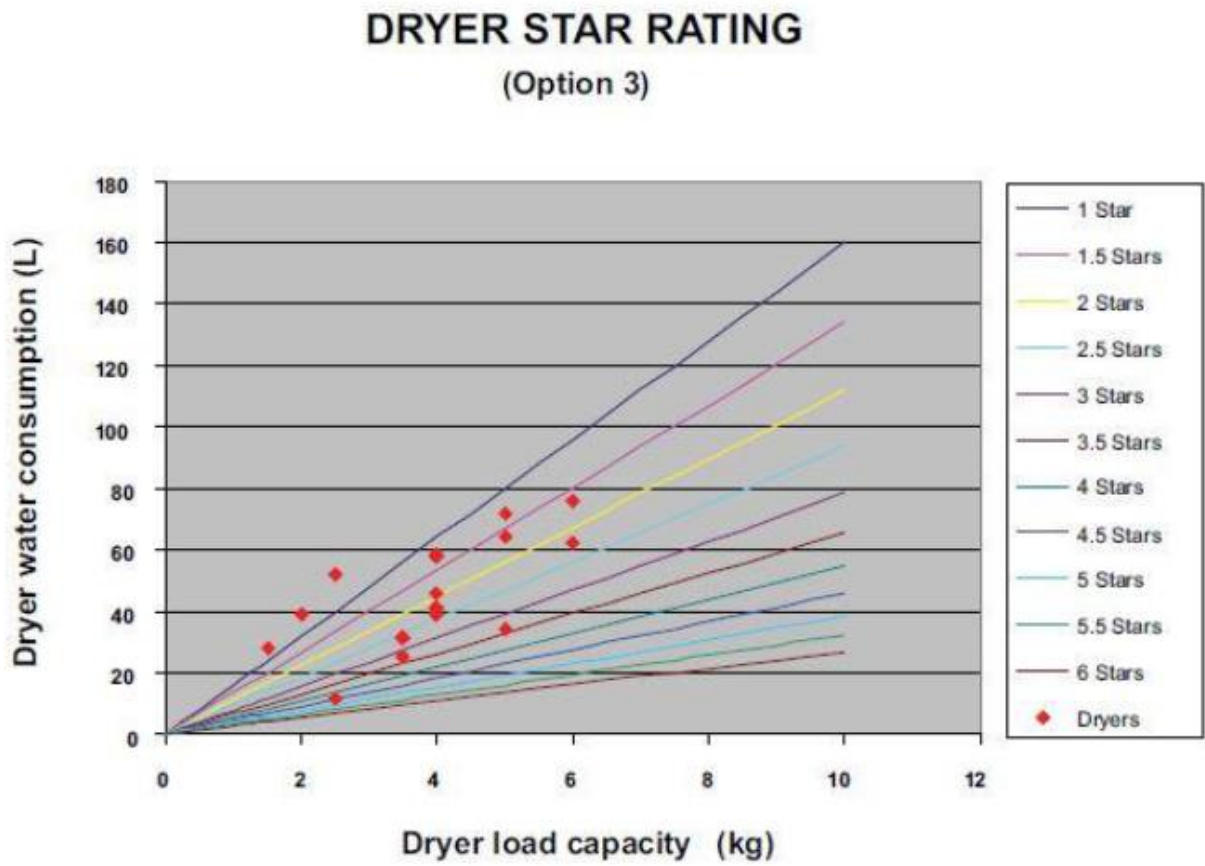


Table 6 — Dryer star rating – (Option 4)

BWC=17xCapacity

WRF=0.3 (30% reduction per star)

Dryer Load Capacity (kg)	1 Star	1.5 Stars	2 Stars	2.5 Stars	3 Stars	3.5 Stars	4 Stars	4.5 Stars	5 Stars	5.5 Stars	6 Stars
0	0	0	0	0	0	0	0	0	0	0	0
1.0	17.0	14.2	11.9	10.0	8.3	7.0	5.8	4.9	4.1	3.4	2.9
1.5	25.5	21.3	17.9	14.9	12.5	10.5	8.7	7.3	6.1	5.1	4.3
2.0	34.0	28.4	23.8	19.9	16.7	13.9	11.7	9.8	8.2	6.8	5.7
2.5	42.5	35.6	29.8	24.9	20.8	17.4	14.6	12.2	10.2	8.5	7.1
3.0	51.0	42.7	35.7	29.9	25.0	20.9	17.5	14.6	12.2	10.2	8.6
3.5	59.5	49.8	41.7	34.8	29.2	24.4	20.4	17.1	14.3	12.0	10.0
4.0	68.0	56.9	47.6	39.8	33.3	27.9	23.3	19.5	16.3	13.7	11.4
4.5	76.5	64.0	53.6	44.8	37.5	31.4	26.2	22.0	18.4	15.4	12.9
5.0	85.0	71.1	59.5	49.8	41.7	34.8	29.2	24.4	20.4	17.1	14.3
5.5	93.5	78.2	65.5	54.8	45.8	38.3	32.1	26.8	22.4	18.8	15.7
6.0	102.0	85.3	71.4	59.7	50.0	41.8	35.0	29.3	24.5	20.5	17.1
6.5	110.5	92.5	77.4	64.7	54.1	45.3	37.9	31.7	26.5	22.2	18.6
7.0	119.0	99.6	83.3	69.7	58.3	48.8	40.8	34.2	28.6	23.9	20.0
7.5	127.5	106.7	89.3	74.7	62.5	52.3	43.7	36.6	30.6	25.6	21.4
8.0	136.0	113.8	95.2	79.7	66.6	55.8	46.6	39.0	32.7	27.3	22.9
8.5	144.5	120.9	101.2	84.6	70.8	59.2	49.6	41.5	34.7	29.0	24.3
9.0	153.0	128.0	107.1	89.6	75.0	62.7	52.5	43.9	36.7	30.7	25.7
9.5	161.5	135.1	113.1	94.6	79.1	66.2	55.4	46.3	38.8	32.4	27.1
10.0	170.0	142.2	119.0	99.6	83.3	69.7	58.3	48.8	40.8	34.2	28.6

Figure 6 – Option 4

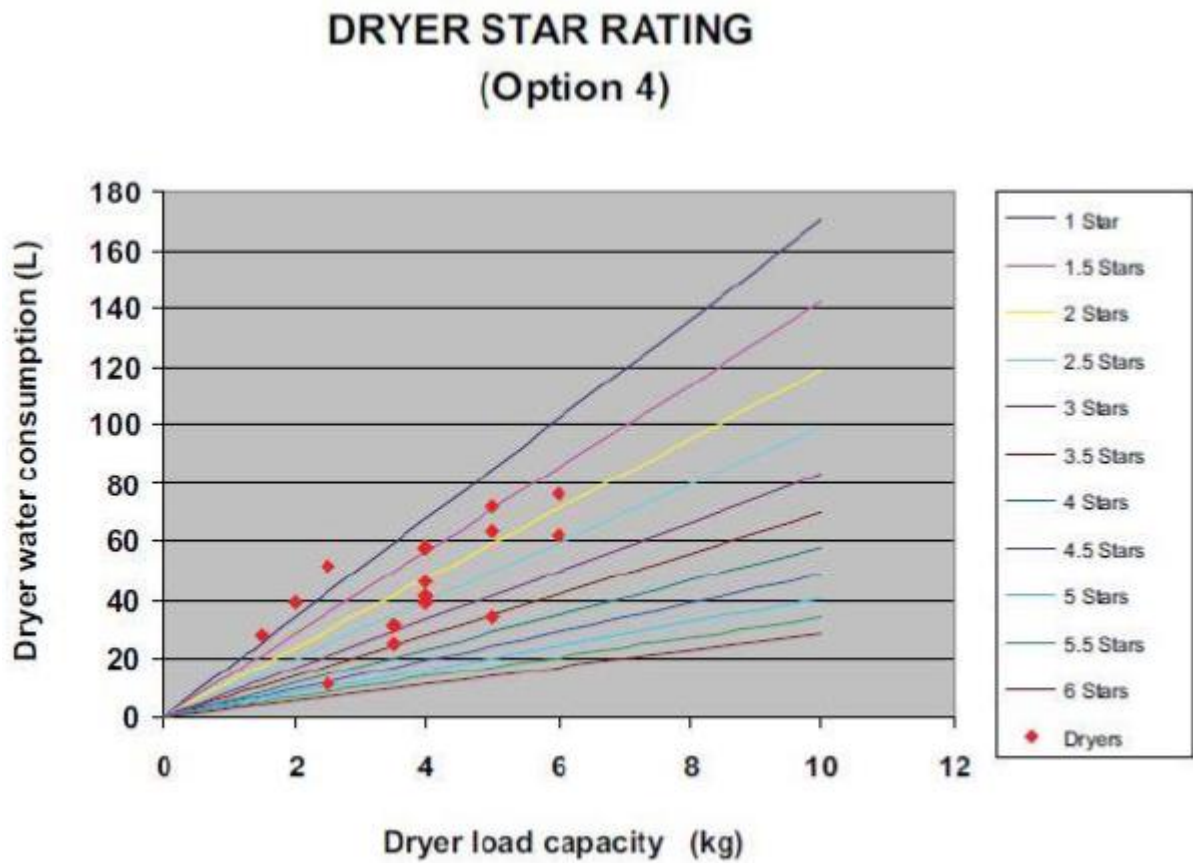


Table 7 — Dryer star rating – (Option 5)

BWC=18xCapacity

WRF=0.15 (15% reduction per star)

Dryer Load Capacity (kg)	1 Star	1.5 Stars	2 Stars	2.5 Stars	3 Stars	3.5 Stars	4 Stars	4.5 Stars	5 Stars	5.5 Stars	6 Stars
0	0	0	0	0	0	0	0	0	0	0	0
1.0	18.0	16.6	15.3	14.1	13.0	12.0	11.1	10.2	9.4	8.7	8.0
1.5	27.0	24.9	22.9	21.2	19.5	18.0	16.6	15.3	14.1	13.0	12.0
2.0	36.0	33.2	30.6	28.2	26.0	24.0	22.1	20.4	18.8	17.3	16.0
2.5	45.0	41.5	38.2	35.3	32.5	30.0	27.6	25.5	23.5	21.7	20.0
3.0	54.0	49.8	45.9	42.3	39.0	36.0	33.2	30.6	28.2	26.0	24.0
3.5	63.0	58.1	53.5	49.4	45.5	42.0	38.7	35.7	32.9	30.3	28.0
4.0	72.0	66.4	61.2	56.4	52.0	48.0	44.2	40.8	37.6	34.7	31.9
4.5	81.0	74.7	68.8	63.5	58.5	54.0	49.7	45.9	42.3	39.0	35.9
5.0	90.0	83.0	76.5	70.5	65.0	59.9	55.3	51.0	47.0	43.3	39.9
5.5	99.0	91.3	84.1	77.6	71.5	65.9	60.8	56.1	51.7	47.6	43.9
6.0	108.0	99.6	91.8	84.6	78.0	71.9	66.3	61.1	56.4	52.0	47.9
6.5	117.0	107.9	99.4	91.7	84.5	77.9	71.9	66.2	61.1	56.3	51.9
7.0	126.0	116.2	107.1	98.7	91.0	83.9	77.4	71.3	65.8	60.6	55.9
7.5	135.0	124.5	114.7	105.8	97.5	89.9	82.9	76.4	70.5	65.0	59.9
8.0	144.0	132.8	122.4	112.8	104.0	95.9	88.4	81.5	75.2	69.3	63.9
8.5	153.0	141.1	130.0	119.9	110.5	101.9	94.0	86.6	79.9	73.6	67.9
9.0	162.0	149.4	137.7	127.0	117.0	107.9	99.5	91.7	84.6	78.0	71.9
9.5	171.0	157.7	145.3	134.0	123.5	113.9	105.0	96.8	89.3	82.3	75.9
10.0	180.0	166.0	153.0	141.1	130.0	119.9	110.5	101.9	94.0	86.6	79.9

Figure 7 – Option 5



Table 8 — Dryer star rating – (Option 6)

BWC=18xCapacity

WRF=0.3 (30% reduction per star)

Dryer Load Capacity (kg)	1 Star	1.5 Stars	2 Stars	2.5 Stars	3 Stars	3.5 Stars	4 Stars	4.5 Stars	5 Stars	5.5 Stars	6 Stars
0	0	0	0	0	0	0	0	0	0	0	0
1.0	18.0	15.1	12.6	10.5	8.8	7.4	6.2	5.2	4.3	3.6	3.0
1.5	27.0	22.6	18.9	15.8	13.2	11.1	9.3	7.7	6.5	5.4	4.5
2.0	36.0	30.1	25.2	21.1	17.6	14.8	12.3	10.3	8.6	7.2	6.1
2.5	45.0	37.6	31.5	26.4	22.1	18.4	15.4	12.9	10.8	9.0	7.6
3.0	54.0	45.2	37.8	31.6	26.5	22.1	18.5	15.5	13.0	10.8	9.1
3.5	63.0	52.7	44.1	36.9	30.9	25.8	21.6	18.1	15.1	12.7	10.6
4.0	72.0	60.2	50.4	42.2	35.3	29.5	24.7	20.7	17.3	14.5	12.1
4.5	81.0	67.8	56.7	47.4	39.7	33.2	27.8	23.2	19.4	16.3	13.6
5.0	90.0	75.3	63.0	52.7	44.1	36.9	30.9	25.8	21.6	18.1	15.1
5.5	99.0	82.8	69.3	58.0	48.5	40.6	34.0	28.4	23.8	19.9	16.6
6.0	108.0	90.4	75.6	63.3	52.9	44.3	37.0	31.0	25.9	21.7	18.2
6.5	117.0	97.9	81.9	68.5	57.3	48.0	40.1	33.6	28.1	23.5	19.7
7.0	126.0	105.4	88.2	73.8	61.7	51.7	43.2	36.2	30.3	25.3	21.2
7.5	135.0	112.9	94.5	79.1	66.2	55.3	46.3	38.7	32.4	27.1	22.7
8.0	144.0	120.5	100.8	84.3	70.6	59.0	49.4	41.3	34.6	28.9	24.2
8.5	153.0	128.0	107.1	89.6	75.0	62.7	52.5	43.9	36.7	30.7	25.7
9.0	162.0	135.5	113.4	94.9	79.4	66.4	55.6	46.5	38.9	32.5	27.2
9.5	171.0	143.1	119.7	100.1	83.8	70.1	58.7	49.1	41.1	34.4	28.7
10.0	180.0	150.6	126.0	105.4	88.2	73.8	61.7	51.7	43.2	36.2	30.3

Figure 8 – Option 6

