

Proposed Clothes Washer Standards Revision Program

AS/NZS 2040.1 and AS/NZS 2040.2

Version 07

**Prepared by Energy Efficient Strategies on Contract to:
The Department of The Environment, Water, Heritage and the Arts**

February 2010

TABLE OF CONTENTS

1	INTRODUCTION	4
2	PROPOSED TIMELINE	4
3	OVERVIEW OF ASPECTS FOR REVISION	6
3.1	AS/NZS 2040.1 Test Method	6
3.2	AS/NZS 2040.2 Regulatory Standard	7
3.3	Other	7
4	DETAILS OF REVISIONS TO AS/NZS 2040.1 TEST METHOD	8
4.1	More Stringent Minimum WEI performance Standard	8
4.2	Revised anti foam dosage specification	9
4.3	Cold and Hot water correction	10
4.4	New bone dry correction factor	10
4.5	Adoption of IEC test load	11
4.6	Adoption of IEC water hardness specification	12
4.7	Adoption of IEC water pressure standard	13
4.8	Mandate D8 geometry for spectrophotometers	13
4.9	Mandate a single detergent for all testing	14
4.10	Adopt IEC standby Power definitions	14
5	AS/NZS 2040.2 REGULATORY STANDARD	16
5.1	Part load testing including integration into calculations for star ratings	16
5.2	Label revisions - 10 star rating scale	20
5.3	Label revisions - check box for dual connect machines	21
5.4	Label revision - program time on the label	21
6	OTHER	22
6.1	Industry to trial EMPA severity of wash material	22
6.2	Number of test runs required	22
7	STANDARDS DEVELOPMENT TESTING PROGRAM	23

7.1	New wash load bone dry correction factor	23
7.2	Adoption of IEC test load	23

1 Introduction

This paper sets out the details of a revision program proposed by regulators to both the clothes washer test standard (AS/NZS 2040.1: 2005) and the associated clothes washer regulatory standard (AS/NZS 2040.2:2005).

The development of this paper is largely based on work undertaken by the EL 15-4 standards committee and in particular Working Group 9. Since 2005, Working Group 9 has been moving towards an alignment with the IEC standard.

Whilst the proposed revisions will not achieve alignment with the impending publication of IEC60456 edition 5, it does aim to help smooth the way for a future alignment should future revisions to the IEC standard prove to be more global in approach and hence more suitable for application of that standard in Australia. Having said that, the proposed revisions are not solely focused on better alignment with the IEC standard and in fact there are several objectives as follows:

- Continue to **work towards alignment with the IEC test standard** where such alignment does not present an unacceptably high level of compromise to the integrity of the energy labelling program. The goal remains to achieve alignment with IEC60456 edition 6, noting that work on edition 6 is yet to commence and significant input would be required to make it suitable for adoption.
- Continued **improvement of the repeatability and reproducibility of the test standard** mainly through tighter specification of materials and test procedures where there are known issues.
- **Introduce a part load test option** that will allow credit to be achieved in the form of improved star ratings for machines that can reduce energy and water consumption in response to a reduced load size.
- **Revise the energy label** to include the new expanded 10 star rating scale and provide enhanced levels of information for consumers.
- **Upgrade the stringency of the water extraction (spin) performance requirement** as a means of reducing the energy consumption of dryers.

2 Proposed Timeline

Table 1 details the proposed work program to complete and publish the revised part 1 and part 2 standards.

It is planned that the part 1 revision be published by January 2011. With the publication of the new Part 2 standard (mid 2011), regulators will no longer accept test reports to the old Part 1 standard.

Regulators will continue to accept registrations to either the old or the new part 2 standard until 30 September 2011 (provided they rely on test reports to the new part 1 standard). On 1 October 2011 all registrations to the old part 2 standard will be grandfathered and regulators will after that date only accept applications to the new part 2 standard.

Table 1: Project Timeline

Year	2010												2011				
	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June
Distribute Proposal to Industry																	
Industry Forum (WG 9)*																	
Part 1 Development Process																	
Industry Comments on Proposal																	
Testing Program (as noted)																	
Distribute Report on Test Results																	
Draft Part 1 Revision (EES)																	
Standards Review Process																	
Public Comment for Part1																	
Stds Meeting to Resolve Comments																	
Committee Ballot Process																	
Standards Final Drafting Process																	
Publication																	
Part 2 Development Process																	
Focus Group Process (label)																	
R&D into part load algorithm																	
Develop new label																	
Draft Part 2 Revision (EES)																	
Standards Review Process																	
Public Comment for Part2																	
Stds Meeting to Resolve Comments																	
Committee Ballot Process																	
Standards Final Drafting Process																	
Publication																	

* Scheduled for 16th March 2010 in Melbourne to adjoin the CESA meeting on 17th March 2010.

3 Overview of Aspects for Revision

This chapter provides a summary of the proposed revisions to the two standards. After outlining the proposed revisions to Part 1 and Part 2 of the standard in Sections 3.1 and 3.2 respectively, section 3.3 details “other aspects” that are considered worthy of investigation as part of this revision process. These may form part of the revision process, depending upon the outcome of those investigations.

The following sections provide detail of each proposed revision including requirements relating to a test program:

Chapter 4 details aspects relating to the test standard AS/NZS 2040.1;

Chapter 5 details aspects relating to the regulatory standard AS/NZS 2040.2; and

Chapter 6 details additional aspects to be considered as part of the standards development program.

3.1 AS/NZS 2040.1 Test Method

Table 2 summarises the proposed amendments to the part 1 test standard.

Table 2: Summary of proposed revisions to AS/NZS 2040.1

Test Aspect	Key Sections Affected	Revision Objective ¹	Current AS/NZS Specification	Proposed Revision
Minimum Water Extraction Index (WEI)	Clause 4.5	IP	1.1	0.80.
Anti foam dosage specification	Appendix A – clause A9	TS	2g/kg load	- 1g/6.25g IEC type B detergent - Specify ‘commercially available silicone-based’ agent.
Cold water correction	A4 and E9.3	TS	Correction factors applied generally. ±2’C tolerance on cold water and hot water supply	Restrict use of correction factors to the following circumstances: <u>Cold:</u> - Correct for all machines with IH - When T>20’C for machines without IH <u>Hot:</u> - When T>60’C for machines without IH
Bone dry correction factor	Appendix C	TS, AL	None.	Adopt the IEC adjustment factor based on hot air inlet temp to drum.
Adoption of IEC test load	Appendix C	AL	Upper/lower limits; no <u>average</u> age specifications.	Adopt IEC age of load requirements.
Adoption of IEC water hardness specification (soft water option)	Clause A5	AL	45ppm	Adopt IEC std for soft water, i.e. - 50ppm CaCO ₃ -e - Tighter tolerance of ±10ppm

¹ **Legend**

AL = Improved Alignment with IEC test method

IP = Improved performance standards designed to drive better environmental outcomes

TS = Tighter specifications designed to improve repeatability and reproducibility

Test Aspect	Key Sections Affected	Revision Objective ¹	Current AS/NZS Specification	Proposed Revision
Adoption of IEC water pressure standard	Clause A4	AL	320kPa	- 240kPa (IEC) - Tighter tolerance of ±20kPa
Mandate D8 geometry for spectrophotometers	Appendix I	TS, AL	0/45 of D8 currently allowed. Adoption of G8 geometry was alluded to in the 2005 revision.	Mandate adoption of a unit with D8 geometry for reflectance measurement of swatches.
Mandate a single detergent for all testing (IEC B)	Clause A8	TS	2 types: AS/NZS and IEC Type B.	Mandate IEC Type B only.
Adopt IEC standby Power definitions	-	AL	“off” and “end-of-cycle” modes	Adopt both “off” and “left on” modes used by the IEC.

3.2 AS/NZS 2040.2 Regulatory Standard

The following revisions to the part 2 regulatory standard are proposed:

- Include provision for part load testing including integration of these results into calculations for star ratings
- Label revision to include the new 10 star scale
- Label revision to include a check box for dual connect machines (hot and cold water supply inlets)
- Label revision to include program time on the label
- Transitional arrangements will be included in the revised standard, as outlined in Chapter 2 Proposed Timeline.

3.3 Other

The following additional aspects shall be considered as part of the standards development program:

- Industry to trial EMPA severity of wash material to possibly replace the current Japanese test material.
- Number of test runs required.

4 Details of Revisions to AS/NZS 2040.1 Test Method

4.1 More Stringent Minimum WEI performance Standard

Through more stringent water extraction standards for clothes washers improved dryer efficiencies may be realised, this is naturally a desirable environmental outcome from a government perspective. The standards committee has generally agreed that the current performance requirement (1.1²) could be made significantly more stringent.

An analysis of the current market (see Table 3) shows that practically the entire market now meets a WEI of 0.9. This means that government will be looking at setting a level somewhat better than 0.9 but not so stringent as to eliminate a very significant proportion of the market. It would be expected that a value in the range of 0.7 to 0.8 would be adopted. New minimum performance standards usually aim to preserve 75% of the current market and on that basis government is likely to adopt a value of 0.75

Table 3: Sales weighted cumulative distribution – models that meet WEI (GfK 2007)

Maximum WEI	Front	Top	Twin Tub	All
0.5	0.82%	0.00%	0.00%	0.38%
0.55	2.88%	0.00%	0.00%	1.34%
0.6	27.99%	0.71%	0.04%	13.41%
0.65	59.49%	21.69%	0.10%	39.07%
0.7	70.72%	41.23%	0.10%	54.55%
0.75	95.65%	61.21%	100.00%	77.64%
0.8	99.95%	71.05%	100.00%	84.80%
0.85	99.95%	87.27%	100.00%	93.30%
0.9	99.95%	98.03%	100.00%	98.95%
0.95	99.96%	100.00%	100.00%	99.98%
1	99.97%	100.00%	100.00%	99.99%

Given that it is proposed to change from the AS/NZS to the IEC load, the question has been raised as to what effect will a change in the load specification have on the WEI result. A study in 2006 “Development of a Global Standard for the Testing of Clothes Washers Stage 1 - Load and Detergent” comparing results from AS/NZS loads and IEC loads found that for the WEI result the IEC load produced an average increase of 0.04 in the WEI with a maximum observed increase of 0.06 (Figure 1; see “Revision Integration requirements” below) . This would suggest that a target maximum WEI of 0.75 using the AS/NZS load would be equivalent to a target maximum WEI of 0.80 using the IEC load. It is possible that with further ageing the IEC load would produce a result closer to the AS/NZS load, so this allowance of 0.05 for an IEC load is considered conservative and may be reviewed further.

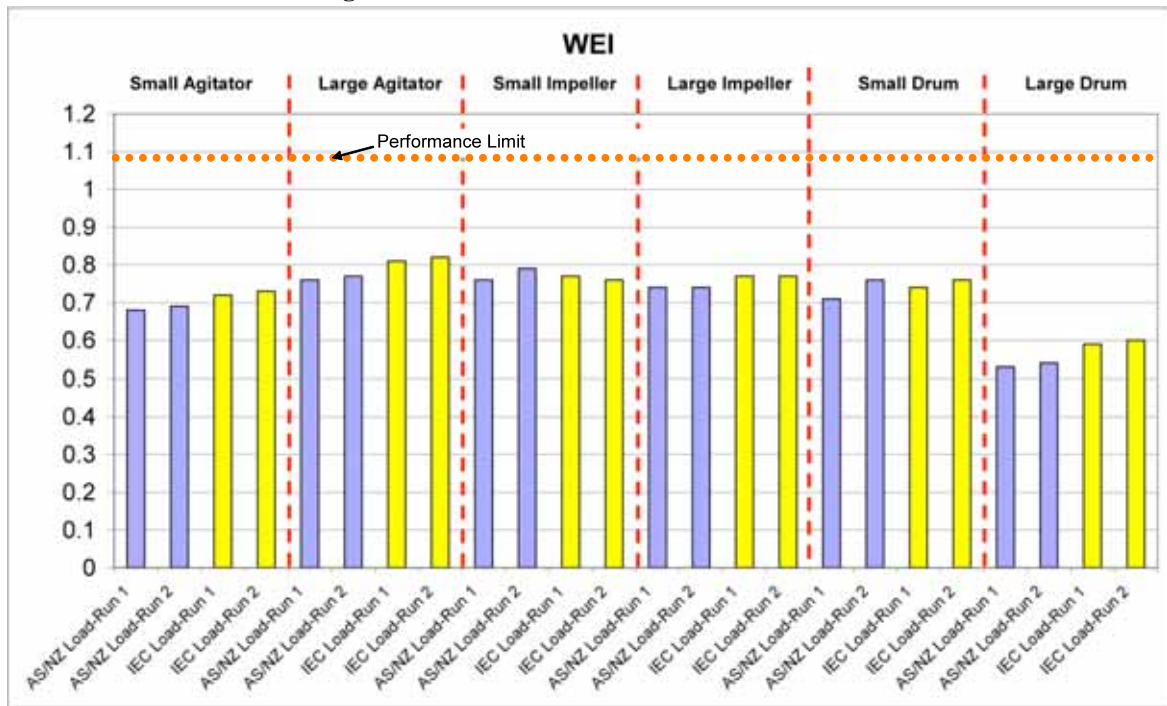
Proposed Revision:

The maximum permissible WEI be amended from 1.1 to 0.8³

² WEI is defined as the water mass remaining in the load after the final spin, as a ratio of the bone dry mass. A WEI of 1.1 means (for example) 5.5 kg of water remains if the dry load mass was 5kg.

³ If for some reason the IEC load were not to be adopted in this amendment to the standard and the AS/NZS load retained then the requirement would be amended to 0.75 rather than 0.8

Figure 1 : WEI Results – Individual Runs



4.2 Revised anti foam dosage specification

Currently the standard specifies a maximum amount of anti foaming agent of 2g/kg load. The anti foam is only used if specified by the supplier. This raises 2 issues, firstly the dosage should be related to the amount of detergent added rather than the load and secondly this provision leads to a wide variety of dosing regimes of the anti foaming agent. A standardised dosing requirement, based on detergent mass rather than load, should improve reproducibility, particularly in compliance testing programs and reduces discretionary elements within the test procedure.

The actual material specification should also be amended to further clarify the type of anti foaming agent as well as the form of emulsifier used. The revised specification shall be based upon advice received from Colgate Palmolive (Spiro Vamvouklis)

Proposed Revision:

Mandate in all tests a requirement to add anti foaming agent at the rate of 1 gram of anti foaming agent per 6.25g of IEC type B⁴ detergent added

Amend the specification of the anti foaming agent to: A commercially available silicone based anti-sudsing agent. This shall be an emulsion consisting of nominal 10% Polydiorganosiloxane (silicone oil) and the balance of water and non ionic emulsifiers. The maximum content of emulsifiers shall be 0.5 %.

⁴ This revision assumes that the only detergent to be permitted for use in the revised standard shall be IEC type B detergent. Should a different detergent be specified then the quantity of anti foaming agent per unit mass of detergent would need to be reviewed

4.3 Cold and Hot water correction

Currently the standard permits a $\pm 2^{\circ}\text{C}$ tolerance on the supply temperature of cold water. This tolerance is required for practical reasons, even though most labs can achieve a closer temperature tolerance most of the time. However, at the limit of the tolerance the cold water correction factor can vary significantly depending upon the supply temperature of the cold water to the extent that the CEC may vary from test to test by 5% or more. From a reproducibility and enforceability point of view this is less than ideal. The situation is similar for hot water although its impact is usually more limited and restricted to washers that do not internally heat their water.

One option would be to tighten the tolerance. One laboratory, questioned about this parameter, suggested that a $\pm 1^{\circ}\text{C}$ tolerance was achievable for them and 0.5°C may be possible. At 0.5°C it is likely that the correction factors could be eliminated altogether.

A more practical approach that does require a change to the test specification is to restrict the use of the correction factor in the energy equations in the standard as follows:

Cold water correction factor: Apply the factor to washers that heat water internally during the test in the same way as currently defined in the standard. For models that do not heat water internally, only apply the cold water energy correction when this is a positive number (ie when the water supply temperature is above 20°C).

Hot water correction factor: Only apply where the hot water temperature exceeds 60°C for machines that do not heat water. This would mean that if the supply temperature is under 60°C the machine will undertake a cooler wash but get no energy benefit from the reduced supply temperature. This change would be applied to all machines that use an external hot water source and do not heat water during the test.

Both of these changes will encourage laboratories to have water supply temperatures that are as close as possible to the nominal values for energy labelling tests.

Proposed Revision:

Cold water correction factor: Continue to apply this to washers that heat water internally during the test. For models that do not heat water internally, only apply the cold water energy correction when this is a positive number.

Hot water correction factor: Only apply where the hot water temperature exceeds 60°C for all models that use external hot water where no heating occurs during the test.

4.4 New bone dry correction factor

The IEC test method includes for an adjustment factor to be applied when determining the mass of a load based upon the hot air temperature inlet temperature inside the dryer drum. It has been found that the inlet temperature can affect the final

residual moisture content of the load during the determination of the bone dry mass, which means a dryer with a cooler outlet temperature will result in a load mass that is slightly heavier than a dryer with a hotter outlet temperature. Differences of as much as 2% of load mass have been observed in some cases.

Inclusion of this correction factor represents good testing practice and technically there should be no issues with this approach, but some proving and calibration of the method is warranted before adoption.

Proposed Revision:

That following proving tests, the IEC formula to correct bone dry mass be adopted.

Revision Integration Requirements:

Proving test program to be undertaken – see section 7.1

4.5 Adoption of IEC test load

The use of the IEC test load in place of the AS/NZS load presents no technical issue for test laboratories. Management of the age of all load items as specified by the IEC standard is however significantly more complex than for the AS/NZS load and this is likely to add some additional costs if adopted. Software is required to track the number of cycles of every item used throughout its life and to make up each test load within defined average weighted age limits.

The main concern with the shift to the IEC load is the question of how the IEC load will impact on the various performance criteria. It is fair to say that the IEC load is probably less representative of a real load (compared to the AS/NZS load) particularly in relation to the IEC (huckaback) towels, a peculiar load item that is used only in Germany.

Having said that it should be noted that:

- The load should not play a large role in the determination of performance.
- Both Europe and the US use the IEC load as do the consumer associations in Australia and New Zealand that undertake washer testing.
- The ongoing supply and availability of IEC load components is considered more reliable than the supply of the AS/NZS load components.

Significant comparative testing of the IEC load was undertaken in 2006 and a report prepared and presented to the Standards committee (Development of a Global Standard for the Testing of Clothes Washers – Stage 1: Load and Detergent). Based on the results of this study, the majority of committee members were comfortable with the concept of a switch to the IEC load. However one supplier was opposed to the change and it was agreed that some further comparative tests should be

undertaken using a Wascator in order to quantify the technical differences⁵ in the loads when subjected to identical washing actions.

It is likely that the change of load from AS/NZS will in itself result in only small to moderate changes in performance for most performance parameters (energy, washing, water consumption, spinning, rinsing) with the IEC being slightly more favourable in most cases except for rinse performance and WEI.

A final consideration in respect of the change to an IEC load is the question of age of load requirements. At present the AS/NZS standard has no requirements in respect of the average age of the load (there are upper and lower age limits on individual items). The IEC edition 5 by contrast has a relatively complex method of managing the age of the load. Management of the age of the load within tight limits can be considered good practice and may improve reproducibility, and is therefore recommended for inclusion in any revision that introduces the use of the IEC load..

Proposed Revision:

That the IEC standard for load type be adopted

That the IEC method for management of the age of the load be adopted.

Revision Integration Requirements:

An adjunct to the 2006 test load comparison test program be undertaken by government – see section 7.2 for details.

Based upon the test results, consider an amendment to the rinse performance pass mark to account for the load change⁶

4.6 Adoption of IEC water hardness specification

The change from a hardness of 45ppm as currently specified in AS/NZS 2040.1 to 50 ppm CaCO₃ + MgCO₃ equivalent as specified in the IEC standard for “soft” water applications is considered to be a very minor change and no issues are foreseen with this alteration.

This potential change was flagged in the preface to the 2005 revision of the standard as “under consideration”.

Note 1: the majority of products in Europe (for example) are tested on the hard water option in the IEC standard at 250 ppm. The USA uses an intermediate water hardness (about 150 ppm, not in the IEC standard) while Asia tends to use the soft water specification.

⁵ Performance changes in current models in response to load type changes of the same mass may be due to how load sensing systems react to the different load types rather than technical differences in the load itself with respect to performance measurements – these tests will assess these technical aspects.

⁶ The 2006 study suggested that the average increase in rinse performance score attributable to the IEC load was 0.15. This would suggest that the rinse performance pass mark could be amended from its current level of 2.25 up to as high as 2.4

Note 2: the tolerance set in the IEC standard is set at ± 20 ppm, this is equivalent to a tolerance of $\pm 40\%$. This tolerance is considered too lax. A tolerance of ± 10 ppm is recommended.

Proposed Revision:

Adopt the IEC standard for soft water ie 50 ppm CaCO_3 equivalent but with a tighter tolerance of ± 10 ppm

4.7 Adoption of IEC water pressure standard

Technically there is no impediment to setting the water pressure at the IEC level of 240 kPa rather than the current AS/NZS level of 320 kPa. Most manufacturers agree that this should have no effect on the performance of their machines. In any case there is a tendency towards lower supply pressure from water authorities, so this is broadly reflective of normal use. The permitted tolerance within the IEC standard (± 50 kPa) is however considered to be unnecessarily lax.

There is however an issue for those test laboratories that rely on a single central pressure control on a common supply used for testing clothes washers, dishwashers and clothes dryers and other products like water heaters. This would mean that until such time that the dishwasher and the clothes dryer standards could be similarly amended to a 240 kPa water pressure requirement, these laboratories would need to provide for different pressure levels. The most practical way of achieving this would be to add pressure limiting valves to the outlets of the clothes washer test bays. Once the other products were aligned to the 240 kPa standard the additional pressure limiting valves could be removed and the master pressure control valve adjusted to the lower value. However, it would be desirable to plan to change water pressure for all 3 whitegoods in a coordinated fashion to 240 kPa if possible.

Proposed Revision:

Adopt the IEC standard for water pressure of 240 kPa but with a tighter tolerance of ± 20 kPa (which is the current tolerance on water pressure for all white goods).

4.8 Mandate D8 geometry for spectrophotometers

The use of a Spectrophotometer with D8 geometry presents no technical issue for test laboratories. Two laboratories in Australia already use this form of machine. The standards committee has already agreed that in the longer term this change should be made and this had been flagged in the 2005 revision to the standard where it stated in Appendix I:

NOTE: It is anticipated that only 8/total and total/8 (also called d8) will remain valid under this Standard beyond 2010.

The exclusive use of a D8 geometry machine will necessitate the purchase of this form of spectrophotometer by some of the laboratories in AU/NZ. The cost is probably in the order of AUD \$10,000 - \$20,000. Measurements are sometimes slower on this form of machine compared to a 0/45 geometry machine, so this could add further cost.

Proposed Revision:

Adopt the IEC standard requirement that a D8 geometry spectrophotometer only be permitted for reflectance measurements of swatches

4.9 Mandate a single detergent for all testing

At present the AS/NZS standard allows for testing of top loaders using one of two detergent options, the AS/NZS specified top load detergent and the IEC type B detergent. For front loaders, only the use of the IEC type B detergent is permitted.

The IEC is supposed to be developing a suite of globally relevant detergents but exactly when this goal will be realised is unclear. In the interim it is considered desirable from a repeatability and reproducibility point of view to shift to a single detergent for all wash testing.

Supply issues with the AS/NZS specified top load detergent and the current applicability of the IEC type B detergent to both top and front loaders indicate that the IEC type B detergent, which is already used extensively, is the best candidate for a single detergent option in the standard in this revision. Also in favour of the IEC type B detergent is that it is phosphate based and has no enzymes (ie similar properties to many consumer detergents currently used in our market). This detergent is used extensively internationally for fabric testing but is no longer specified in the current edition of IEC60456. Another potential advantage of the IEC type B detergent is that it may at some stage be re-introduced in to the IEC standard (as a phosphate based alternative for jurisdictions outside Europe) (ie it may present as an easy fix to the current lack of global applicability of the IEC standard detergent).

Proposed Revision:

Revise the current standard so as to allow only the use of IEC – type B detergent

4.10 Adopt IEC standby Power definitions

The requirements for standby and off mode power were included in AS/NZS2040.1 in 2005 well before the content of Edition 5 of IEC60456 was fully developed. The mode definitions in the forthcoming Edition 5 are a result of a vigorous debate within the IEC working groups for modes relevant for clothes washers. Most of this debate occurred well after the publication of the AS/NZS requirements. Both standards define 2 modes as relevant.

The mode definition for off mode in IEC and AS/NZS are technically equivalent.

The definition of “end of cycle” mode in AS/NZS includes measurement of post program energy (including anti-creasing operations) and the determination of the steady state power before the load is removed by the user. The IEC definition of “left on mode” requires the load to be removed immediately on program completion but with no further action by the user to turn the product “off”.

In practical terms, the difference in these mode definitions will be small for most products. This mode is really only relevant to European style products with a hard or manual off switch (most electronically controlled products automatically revert to “off” at the end of the program). However, the new IEC definition is considered to be more realistic (as it measures the power state after the user removes the load) and it means that the power in this mode can be determined after a standard test without the need for a separate run (which is required in some cases under AS/NZS for a range of technical reasons). The AS/NZS condition is not considered strictly consumer relevant as a wet load is never left in the washer for a very long period. The change would mean that post program energy would be ignored, but this is generally very small in terms of total energy consumption (and in fact may not even be present if the user intervenes at the end of the program).

Proposed Revision:

Adopt the technical requirements of the IEC off mode and “left on” mode in place of current requirements

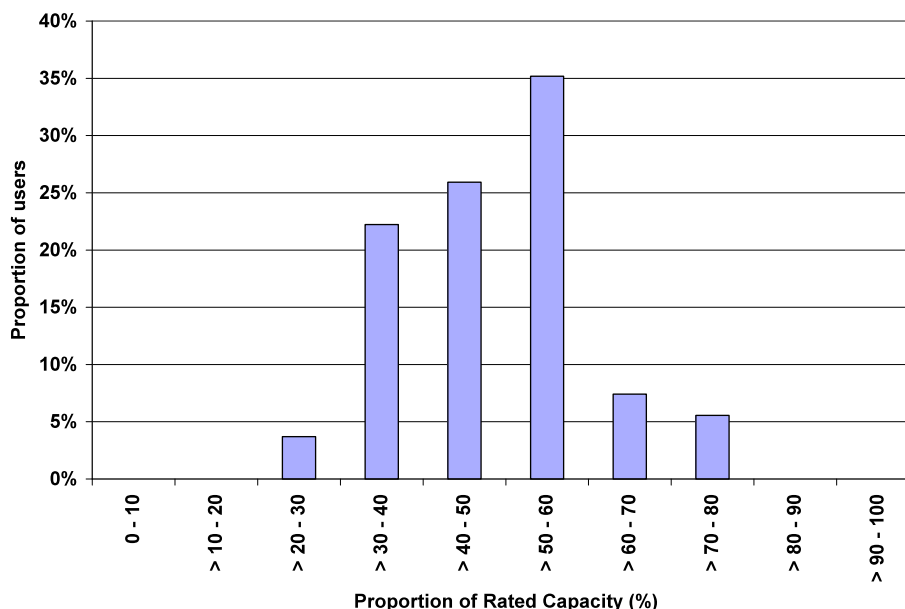
5 AS/NZS 2040.2 Regulatory Standard

5.1 Part load testing including integration into calculations for star ratings

Washing machines that are designed to optimise performance for part load operation can offer significant savings in both energy and water. At present the AS/NZS washer standard does not provide a means for assigning credit for such features or even a means of identifying those products that can save energy and water at part load. It has been generally agreed with industry that a means of assigning credit in terms of the energy and water efficiency needs to be developed to take account of machines that optimise their performance according to the load size. It was also agreed that undertaking of tests at part load should be optional. Those that do not undertake part load tests would however be required to use results for energy and water at rated capacity in place of results at part load in any revised algorithm for calculating CEC and star rating index.

Credible research from a number of organisations estimates that average consumer loads during normal use are about 50% (or less) of rated capacity, so the current energy labelling requirement is far from normal use. In a study conducted by Choice entitled Washing Machine User-Trial Report (2007) a total of 27 householders were asked to “fill the machines (4 sample machines, 2 top and 2 front loaders) as you would at home when doing a full load of washing, stopping when you think you would not reasonably put any more items in”. The results are presented in Figure 2.

Figure 2: Actual full loading as a proportion of rated capacity (Choice 2007)



If part loading is to be included there are five main questions:

- What level of load should be used to define a “part load”?
- What requirements should there be in terms of program specifications?
- What performance parameters should be verified during a part load test?

- What proportion of washes undertaken by householders should be assumed to be undertaken at part load?
- Should any credit be given to manual systems for load size or should the part load requirements only be applied to automatic load sensing systems?

A. What level of load should be used to define a “part load”

Research by Choice (and others) suggests that to the average consumer a “full load” is on average approximately half the rated capacity of the machine. This would suggest that a consumer defined “part load” would in reality be somewhat less than half the rated capacity. Current capacity ratings of machines sold in Australia range from 4 kg to 10 kg with a sales weighted average of approximately 7 kg. The actual distribution in 2008 is shown in Figure 3.

If we assumed that a “part load” equated to 50% of rated capacity, this would mean that for the range of available machines, a part load would range from 2 kg (for a 4 kg machine) to 5 kg for a 10 kg machine with the sales weighted average being 3.5 kg (for a 7 kg machine). The part load settings for each rated capacity based on these assumptions are shown in Table 4. Note that test load definitions must be multiples of half kg, so the actual part load test cannot always be exactly 50%. (eg 50% of a 6.5kg rated load would be 3.25kg which is not a load covered by the standard)

Figure 3 Distribution of rated capacity by sales of clothes washers 2008 (GfK)

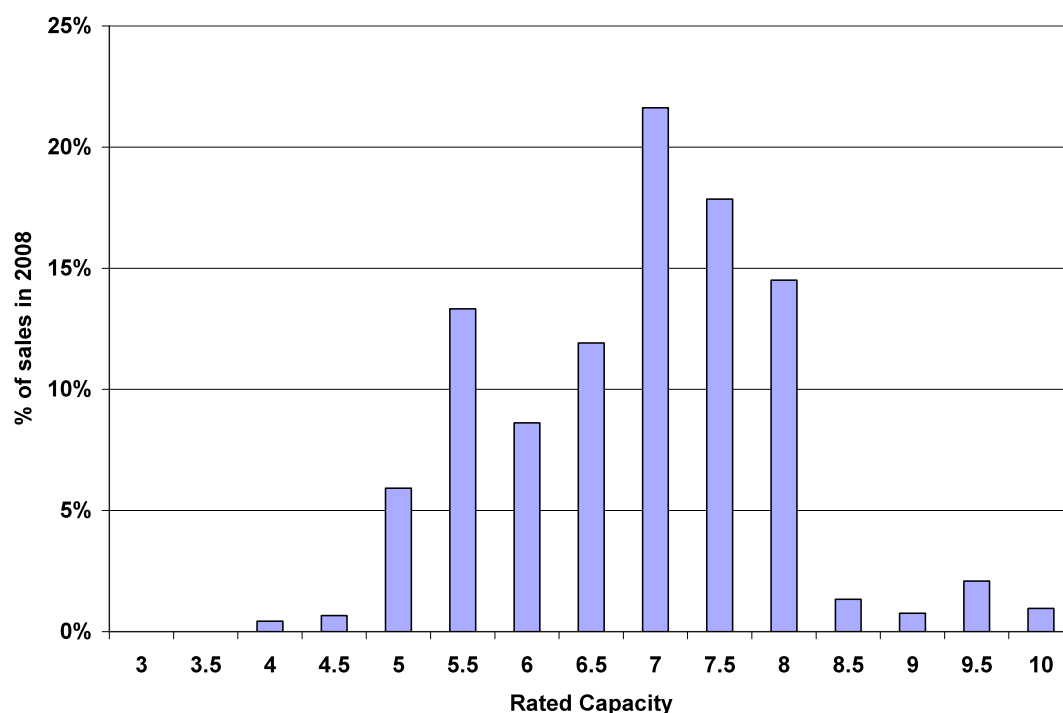


Table 4: Possible part load settings for rated capacities from 1 kg to 10 kg

Rated Capacity (kg)	Part Load rating (kg)
1	1
1.5	1
2	1
2.5	1
3	1.5
3.5	1.5
4	2
4.5	2
5	2.5
5.5	2.5
6	3
6.5	3
7	3.5
7.5	3.5
8	4
8.5	4
9	4.5
9.5	4.5
10	5

Some have argued that part load should be defined by a fixed load size (possibly 3 kg). Whilst either approach would be viable, each will have its advantages and disadvantages and each will bring its own bias to the performance ratings. Further discussion with industry on this point is recommended.

In reality the underlying problem with setting a realistic test load size is exacerbated by the unrealistic rating system currently used. Currently suppliers push rated capacity to the maximum value where they can still pass the performance requirements in the standard. Consumers tend to use volumetric rather than mass assessments when determining the load capacity of a machine. Volumetric rating could be adopted as part of the proposed revision to the part 1 standard should there be sufficient industry support for such a change. For example, a volumetric rating might take the form of the following:

For each X number of Y type ping pong balls that can be fitted into the drum*, a capacity rating of up to X *0.5 kg may be claimed up to a maximum of 10 kg

This approach is not dissimilar to that used for rating dishwashers where ratings are based upon the number of objects (plates, cups, saucers etc) of given sizes that can be fitted into the machine.

However, it should be noted that a volumetric capacity rating is not really used in any other country in the world and there is no data on drum volumes available for any models in the Australian market. If it was decided to move to a volume based approach, there would need to be a transition period where volume and rated capacity

data was collected in parallel before a new volume based system could be implemented.

B. What requirements should there be in terms of wash program specifications?

Generally the wash program will need to meet the requirements laid down for washing a load at rated capacity (ie suitable for washing a normally soiled cotton load etc). However there will be further requirements relating to the selection of the program suitable for part load washing based on the user control system. There are three main category's of user control to consider:

- Auto load sensing
- User selectable part load options
- Manual fill

If part load is to be defined as 50% of rated capacity then it would only make sense to allow part load based ratings for machines that use auto load sensing. This is because the majority of consumers would consider a load at 50% of rated capacity to be a “full load” and hence they would generally not manually select any part load setting that may be available to them when washing a load deemed in the standard to constitute a “part load”.

In all cases, the program nominated for part load washing must be the same one that is recommended by the supplier in their literature for a normally soiled cotton load at rated capacity (specific part load settings are not permitted in the program selection). Any reduction in energy and water must be automatic and must be included in the recommended program specification for energy labelling without additional settings.

C. What performance parameters should be verified during a part load test?

Most industry members asked about this question agreed that the full range of performance parameters that apply to a test at rated capacity should be required to be met when conducting a part load test. Whilst this makes the testing requirement more onerous there are two important considerations in favour of such an approach:

- Part load testing is optional, so suppliers are not required to undertake these tests.
- A danger exists that an unscrupulous supplier could design a part load program that gave exceptional energy performance but very poor wash/rinse /WEI performance so the normal consumer protection performance tests still need to be applied.

D. What proportion of washes undertaken by householders should be assumed to be undertaken at part load?

There is little available data on this question. If part load were to be defined as 50% of rated capacity consumer research would suggest that many washes undertaken in the field would be at “part load” or less. Some manufacturer data suggests that a minority of consumer loads during normal use are above 70% of rated capacity.

If the current capacity rating system is to be retained (which is likely) then the compromise solution may be to assume a part load is 50% of rated capacity but that it constitutes 75% of all washes undertaken and that the other 25% is undertaken at rated capacity (even though use at rated capacity is fairly uncommon) for the purposes of energy efficiency determination. The rated capacity as currently defined, while

being somewhat unrealistic from a consumer perspective, does define a maximum technical capability of the machine which provides some basis for a realistic part load determination.

Recommendation:

That provision be made in the standard for voluntary part load testing of machines that use auto load sensing.

That in all cases, the program nominated for part load washing must be the same one that is recommended by the supplier in their literature for a normally soiled cotton load at rated capacity.

That to be valid, a part load test must include a requirement that all performance requirements at full load also be met at part load

That for rating purposes, where part load test results are provided, these results shall be used in the algorithms to determine CEC and SRI and that they carry a weighting of 75% and that test results at rated capacity carry a loading of 25%

That these recommendations be subject to industry input prior to finalisation of the revised part 2 standard.

5.2 Label revisions - 10 star rating scale

In line with government policy and the current editions of the refrigerator, air-conditioner and TV standards, it is proposed that the revised clothes washer part 2 standard include a star rating range up to 10 stars along with associated changes to the artwork. The inclusion of a part load energy into the algorithm also needs to be considered (ie whether a star rating regrade is required or whether automatic part load sensing systems receive some credit within the existing algorithm).

Where the supplier does not have automatic load sensing and/or where the supplier elects not to conduct a part load test, the labelling algorithm will assume that the energy and water consumption is the same at the nominated part load as the full rated capacity load for the purposes of star rating calculation.

Recommendation:

That the star rating scale and associated label artwork be amended to include a 10 star scale

Note: An analysis of the performance range in the current market shall be undertaken to determine an appropriate re grading of the current star bands into a 10 star band (noting that regrading may not be necessary given the current distribution and the proposed extension to 10 stars). Consideration of the impact of the inclusion of part load test results will also need to be taken into consideration⁷.

⁷ A review of available part load test data (should such data exist) shall be undertaken to help inform this process.

5.3 Label revisions - check box for dual connect machines

Dual connect (hot and cold) machines are recognised by some consumers as advantageous, particularly if the consumer can import low cost hot water from sources such as a high efficiency water heater or a solar water heater.

At present only the web site listing provides this information. From experience it is known that some consumers are disappointed with their purchase once they discover that the product they have purchased cannot draw hot water into the machine. A number have expressed a concern that without such information on the label the credibility of the scheme is at least in part compromised.

It is proposed that a checkbox be provided on the label indicating if the product is dual connect or not (similar to the checkbox on air-conditioner labels that indicate if the product has inverter type technology included).

Recommendation:

That a check box be added to the energy-rating label to indicate if the clothes washer has dual connection facilities

Artwork shall be prepared to demonstrate how this information can be incorporated into the label design. This shall be provided to industry for consideration and comment before incorporation into a revision to the part 2 standard

.

5.4 Label revision - program time on the label

At present only the web site listing provides information regarding the program time. From experience it is known that some consumers are disappointed with their purchase once they discover that the product they have purchased can take several hours (more than 4 hours in some cases) to complete the recommended main wash program. A number of stakeholders have expressed a concern that without such information on the label the credibility of the scheme is at least in part compromised.

Recommendation:

That the program time be included on the energy-rating label

Artwork shall be prepared to demonstrate how this information can be incorporated into the label design. This shall be provided to industry for consideration and comment before incorporation into a revision to the part 2 standard

6 Other

6.1 Industry to trial EMPA severity of wash material

Government proposes to procure some samples of the EMPA severity of wash material and make it available to industry for evaluation as a possible replacement for the current severity of wash material. The EMPA severity of wash material is one of the options being considered for inclusion in edition 6 of the IEC standard (refer PAS 62473).

6.2 Number of test runs required

Provisions in the current part 2 standard require the submission of data on 3 separate units of the same model (1 run each) as the basis for an energy labelling application. By contrast the IEC standard mandates 5 runs per test unit in order to get a single valid result.

Recent testing in Australia has shown that washing machine testing is inherently variable and that multiple test runs are usually required to confirm performance on a particular machine. There would therefore appear to be some merit in undertaking multiple tests on each unit. Most observers consider the IEC use of 5 runs unwarranted and it is generally agreed outside of Europe that the 5 test run regime will need to be modified in edition 6 if this edition is to be widely adopted outside of Europe.

It is proposed that the current requirement for a single test on three separate units be maintained but that a advisory note be added. The advisory note would explain that research indicates that washing machine testing is inherently variable and that applicants should consider the use of multiple test runs to improve the reliability of the results used for registration purposes. The regulatory standard already allows multiple testing on each unit for registration purposes.

Recommendation:

That the revised part 2 standard flag the intent of regulators to shift to a 5 test run regime on a single test unit in line with the IEC standard

7 Standards Development Testing Program

This section summarises the testing program proposed to be undertaken to facilitate the proposed amendments noted in section 4

7.1 New wash load bone dry correction factor

The purpose of these tests is to determine if the IEC correction factors for bone dry mass estimates are accurate (there exists some doubt about the IEC values). A series of tests shall be undertaken on an IEC load. The load shall be brought to a standardised condition by hanging in a temperature and humidity controlled space for a period of at least 2 days then weighed. The load will then be dried in accordance with the test method using a pre-set inlet air temperature. At the end of the process the load shall be weighed again. This process shall be repeated for a total of 5 inlet temperatures as follows:

- 90C
- 100C
- 110C
- 120C
- 130C

The results shall be compiled and a function of inlet temperature vs moisture removal shall be calculated so as to determine a bone dry factor. This can then be compared to the value adopted in the IEC.

7.2 Adoption of IEC test load

This test is designed to determine the technical impact of the different load types on the performance characteristics of a machine that undertakes an identical set of operations irrespective of the load type. In each test undertaken the following parameters are to be measured:

- Hot water consumption for wash cycle
- Cold water consumption for wash cycle
- Total hot water consumption
- Total cold water consumption
- Hot water energy
- Cold water energy
- Total energy consumption (exclusive of standby power)
- Soil removal
- Standard deviation
- Rinse performance (using method as proposed in current AS/NZS amendment)
- Severity of wash
- Spin index

To obtain the necessary run to run consistency (irrespective of load) it is proposed to use a Wascator FOM 71 CLS computer controlled washing machine (IEC reference) on both load types. This machine gives precise control of fill volumes, wash and rinse times and rpm for all actions including wash and spin operations. This means the

effect of other variables is minimised. Repeat tests will be conducted to assess run to run variability. A total of 3 runs will be conducted on each of the 2 load types (AS/NZS and IEC). Some form of age control on the loads shall be applied.

Total number of runs = 6

Settings and test materials

- Generally settings and test methods to be as per AS/NZS 2040.1:2005
- Load Mass – as rated (6 kg for Wascator)
- Load preparation – all pre-conditioning to be done with PBIS in combination with detergent where detergent is specified to be used.
- Detergent – IEC B at 12.5g/kg
- Attach the swatches to items in the AS/NZS fashion
- Where possible, attach the swatches to matching items in each load type
- Follow the AS/NZS loading method and pattern

A wash program on the reference machine using the AS/NZS load will be developed to obtain results close to or just over those required to meet the main performance requirements of AS/NZS 2040:

- Soil removal greater than or equal to 80 %
- Standard deviation less than or equal to 4 %
- Rinse performance less than or equal to 2.25 mg/kg

The proposed reference program and load details are:

- Main wash 15 L fill washing for 30 mins.
- Drain and spin for 3 mins
- Rinse 1: 15 L for 10 mins
- Drain and spin for 3 mins
- Rinse 2: 15 L for 10 mins
- Drain and spin for 3 mins
- Rinse 3: 15 L for 10 mins
- Drain and spin for 5 mins

Some changes to the program specifications may be required on an iterative basis if the required performance targets are not achieved in the first attempt.